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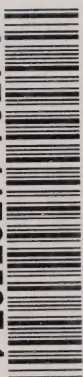
An Introduction to the Geography of

NEWFOUNDLAND

By

B. V. Gutsell

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Information Series No. 1

OTTAWA, CANADA

1949











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## FOREWORD

This handbook is designed to present an outline of the physical background and the economic development of Newfoundland, and to show how these factors have influenced the life of the island's people. It is hoped that this brief study will prove of use and interest, and will further an understanding of this unique island. The handbook was prepared in the Geographical Bureau as one of a series of Information Bulletins to be published on various aspects of the geography of Canada.

*Jas. A. MacKinnon*

MINISTER OF MINES AND RESOURCES



## TABLE OF CONTENTS

Section	Page
I. INTRODUCTION.....	2
II. GEOLOGY AND PHYSICAL FEATURES.....	3
Geological History.....	3
The Rocks.....	6
Topography.....	7
Drainage.....	11
III. CLIMATE AND WEATHER.....	16
Winds, Temperatures, and Precipitation.....	16
Fog conditions.....	21
Ice conditions.....	21
IV. NATURAL VEGETATION.....	26
V. SOILS.....	31
VI. NATURAL RESOURCES AND ECONOMIC DEVELOPMENT.....	33
Forestry.....	34
Fishery.....	44
Minerals and Mining.....	50
Water-power.....	56
Agriculture.....	57
VII. EXTERNAL TRADE.....	61
VIII. SETTLEMENT.....	65
IX. COMMUNICATIONS.....	71
X. LABRADOR.....	74
APPENDIX	
A. Place Names of Newfoundland.....	78
B. Maps and Charts.....	80
C. Brief Bibliography.....	82



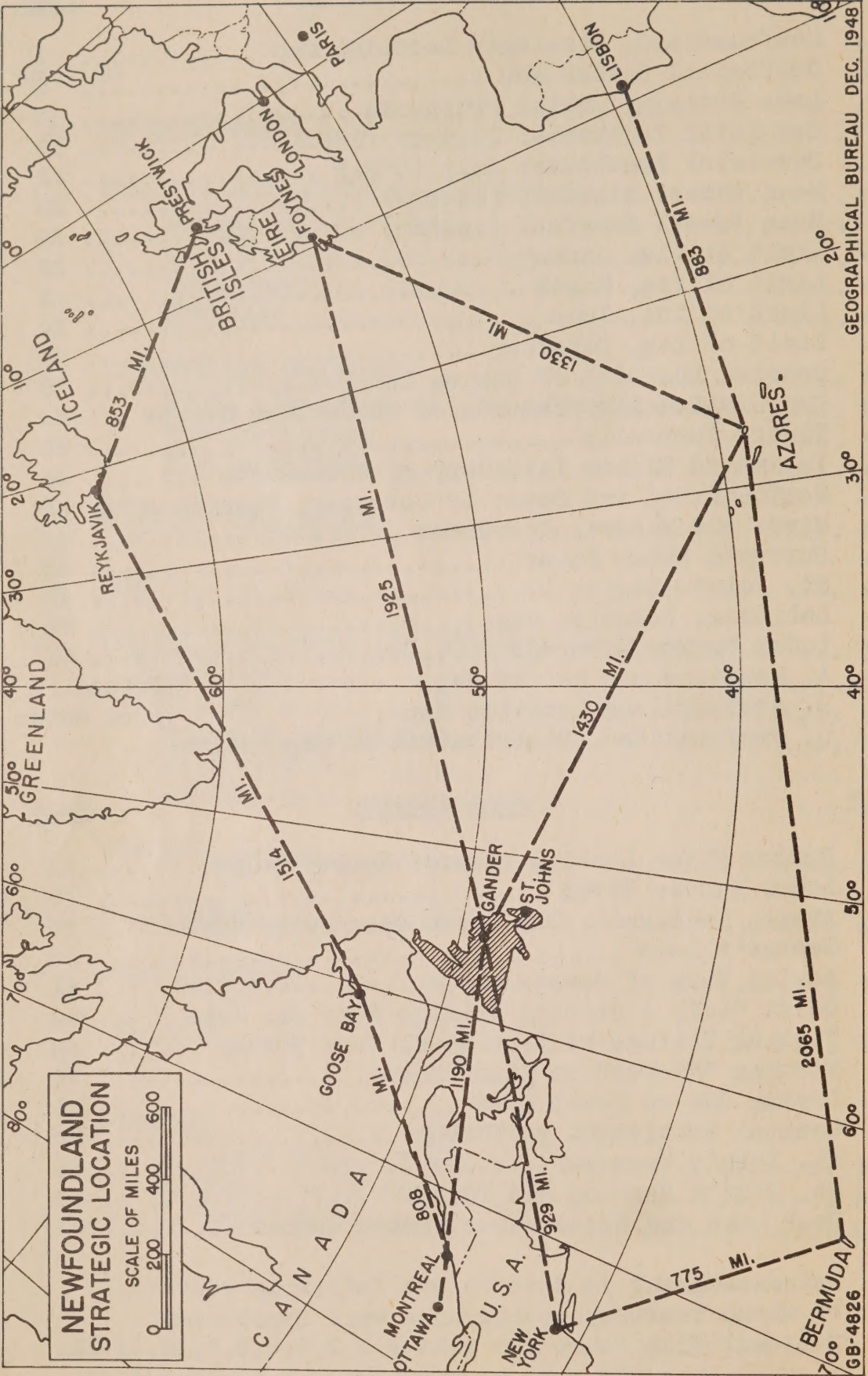
# LIST OF ILLUSTRATIONS

<u>Figure</u>	<u>Maps and Diagrams</u>	<u>Page</u>
1.	Newfoundland, Strategic Location Map .....	1
2.	Geological Sketch Map .....	5
3.	Lake Pattern, Avalon Peninsula .....	12
4.	Sea-level Isotherms: January (0°F.) .....	19
5.	Sea-level Isotherms: July (0°F.) .....	19
6.	Mean Annual Rainfall (inches) .....	20
7.	Mean Annual Snowfall (inches) .....	20
8.	Limit of Ice, January .....	23
9.	Limit of Ice, March .....	23
10.	Limit of Ice, June .....	24
11.	Limit of Ice, December .....	24
12.	General Location of Barren Land .....	29
13.	Comparative Distribution of Occupation Groups ...	33
14.	Timber Ownership .....	35
15.	Estimated Timber Inventory by Watersheds .....	38
16.	Newfoundland and Coast of Labrador, Fishing Areas	43
17.	Mines and Mineral Resources .....	49
18.	Surveyed Water Power .....	55
19.	St. John's Region .....	68
20.	Labrador, Location Map .....	75
21.	Index to Map Coverage .....	81
	A. Newfoundland Relief Map .....	) Folded in
	B. Newfoundland Location Map .....	) back cover
	C. Newfoundland, Distribution of Population)	

<u>Plate</u>	<u>Photographs</u>	<u>Page</u>
1.	Humber River Looking Towards Humber Gorge.....	14
2.	Lower Humber River .....	15
3.	Avalon Peninsula, The Coast Near Petty Harbour ..	25
4.	George's Lake .....	30
5.	Aerial View of Corner Brook .....	41
6.	Quidi Vidi, A Fishing Village Near St. John's ...	42
7.	Fishing Village of Flat Rock, Near Torbay .....	42
8.	Fishing "Flakes" at Pouch Cove .....	46
9.	Drying Cod at Pouch Cove .....	46
10.	Coastal Settlement at Torbay .....	60
11.	St. John's Harbour .....	66
12.	St. John's Harbour and Town .....	66
13.	Deer Lake and Water Power Installations .....	70

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**NEWFOUNDLAND  
STRATEGIC LOCATION**

SCALE OF MILES  
0 200 400 600

GEOGRAPHICAL BUREAU DEC. 1948



I.

INTRODUCTION.

The island of Newfoundland lies across the Gulf of St. Lawrence between the parallels  $46^{\circ} 35'$  and  $51^{\circ} 39'$  N. and the meridians  $52^{\circ} 36'$  and  $59^{\circ} 25'$  W. In the north it is separated from the coast of Labrador by the Strait of Belle Isle which is only 11 miles across at its narrowest point. To the southwest it is separated from Cape Breton Island by Cabot Strait which is about 70 miles across.

Newfoundland is the most easterly part of the North American continent and consequently the closest point to Europe. The port of St. John's lies less than 2,000 miles from the western ports of the British Isles, while the airline distance between Gander Airport and London, England, is 2,360 miles, which approximately equals the air distance between Montreal and Vancouver. Newfoundland lies on the great circle trade routes across the Atlantic between the seaports and airports of Northwest Europe, and those of Northeastern America. It is thus well situated strategically for trans-ocean transport, and is, consequently, well located for access to its principal markets. The island's main exports are fish, forest and mineral products, and these, being bulk commodities, are transported cheaply by sea.

The island is triangular in shape and has a land area of 43,000 square miles. The three sides are each about 320 miles in length, but the coastline, which is greatly indented with numerous bays and headlands, is about 6,000 miles. Newfoundland in general is a plateau of rolling relief, rising to its greatest elevation in the Long Range Mountains, which lie along the western border and exceed 2,000 feet in height. The general level of the land slopes gradually from its high western edge towards the Avalon Peninsula which has an elevation of about 700 feet.



## II.

### GEOLOGY AND PHYSICAL FEATURES.

#### Geological History.

Newfoundland forms part of the geological unit known as Greater Acadia, and this embraces the New England States, the Maritime Provinces of Canada, and the continental shelf which lies below the seas off the Atlantic Coast.

The island is built of rocks ranging in age from early Precambrian, which includes the oldest known rock formations, to Pennsylvanian, or late Palaeozoic. Through all later geological time until the Quaternary, for a period of over 200 million years, there is no record of any sedimentary rocks being formed.

Early Precambrian time was marked by the accumulation of sediments followed by mountain-building when igneous rocks were intruded and existing rocks altered by metamorphism into schists and gneisses. The mountains formed in this way were worn down by erosion. During late Precambrian time further sedimentaries and volcanic rocks accumulated.

During the Palaeozoic era, Acadia was an unstable mass and through various periods ancient seas covered the whole region. Over a period of millions of years, sediments carried by rivers from the adjacent land masses were deposited in these early seas. At the same time the sea floor was subsiding gradually and a great thickness of materials accumulated in the trough-like depression that formed.

The structure existing today was developed during mountain-building movements which took place at the close of the Ordovician and again during Middle Devonian times. The Acadian rocks were thrust against the resistant mass of the Canadian Shield, crumpled into folds and raised above the level of the Palaeozoic sea to form great ranges of fold mountains. These movements were accompanied by the intrusion of a variety of igneous rocks including gabbros, granites and peridotites. At a later stage, during the Mississippian period, the area subsided and



the Atlantic waters re-entered Acadia. At the close of the Palaeozoic period the region was affected by another deformation, the great Appalachian Revolution.

The stresses which produced these earth movements had a similar alignment and resulted in the production of northeast trending folds and overthrust faults typical of the whole Appalachian region. In Newfoundland, the east and west coasts and the main topographic features show this same well-defined trend. The drainage also took advantage of these zones of weakness and streams flowed toward the northeast and southwest. Several of these original streams were the forerunners of the present day rivers such as the Codroy and Humber.

From Pennsylvanian times, when the Coal Measures were formed in the Grand Lake - White Bay Basin, up to the Ice Age, Newfoundland was subject to erosion and the high mountains were worn down to a low plateau-like surface. During this long interval, periods of stability were followed by elevation or depression of the land and each uplift led to renewed erosion. The present elevations suggest that the most recent uplift was greatest on the west coast thus tilting the plateau surface to the southeast. Finally, submergence produced a coast-line deeply indented with bays and fjords, and fringed with islands.

### Glaciation.

As a result of recent surveys<sup>x</sup> it has been concluded that in Pleistocene times, the whole of Newfoundland was completely glaciated during the latest or Wisconsin stage, and supported a thick ice-cap from which ice radiated in all directions. The uplands were scraped down to bed-rock by the ice which removed loose surface material and either deposited it in the surrounding seas or left it as moraine in the lower valleys. River valleys were deepened and scoured by the ice, and the drainage pattern was disorganized by the damming of valleys with glacial drift of variable thickness.

x - Twenhofel, W.H., and MacClintock, P. Surface of Newfoundland. 1940.



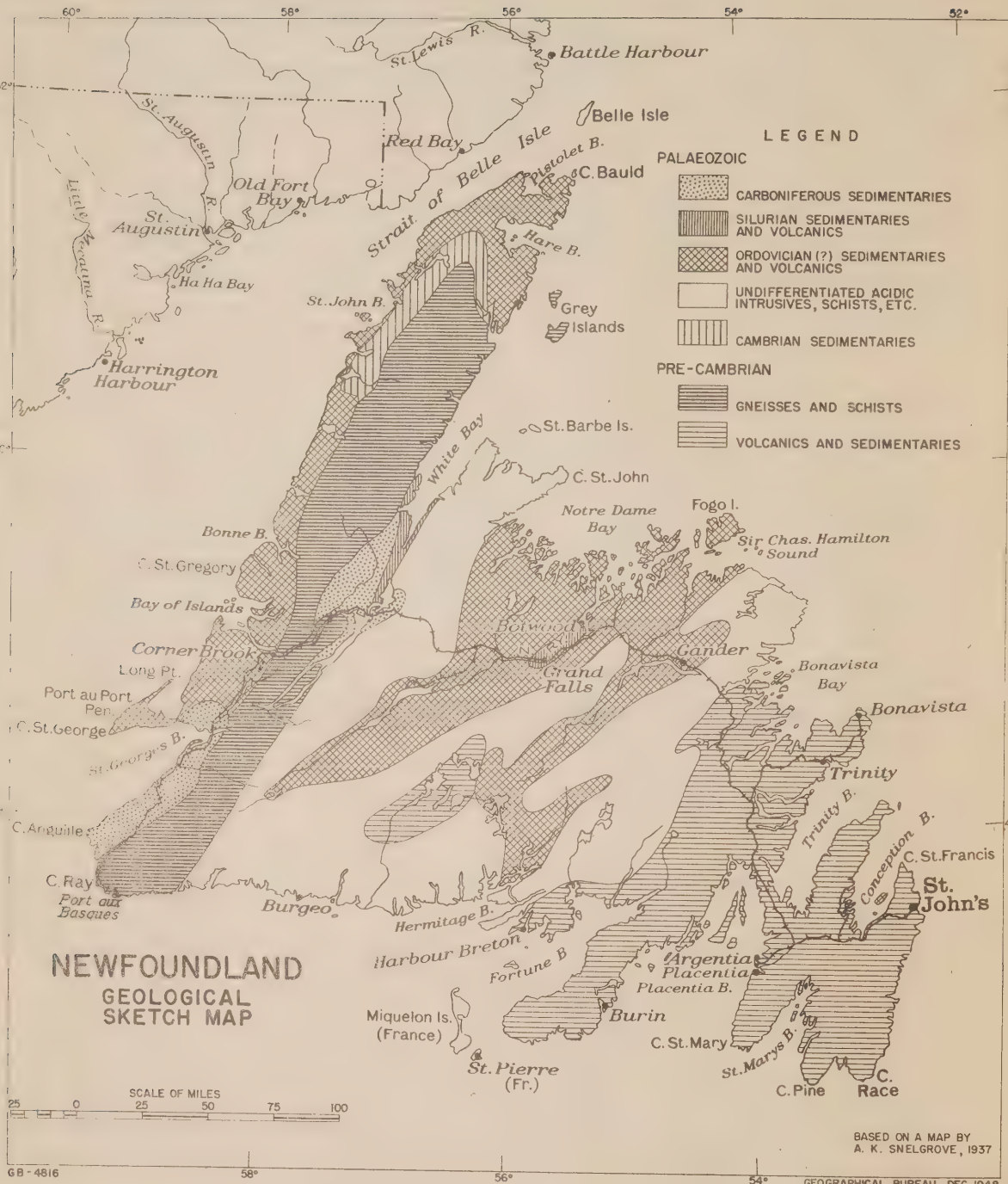


Fig. 2.



The Rocks.

Age	Area		
	West	Centre	East
Pennsylvanian	Sandstones, shales, Coal Measures	No record	No record
Mississippian	Limestones, sandstones, conglomerates	No record	No record
Devonian	Sandstone, conglomerates, shales	No record	No record
Silurian	No record	Sandstones, conglomerates, shales, volcanics	No record
Ordovician	Limestones, sandstones, breccias	Slates, shales, volcanics	Sandstones, shales
Cambrian	Sandstones, limestones, shales, slates	No record	Slates, conglomerates, limestones

The rocks represented are of ancient date ranging in age from earliest Precambrian to Pennsylvanian (Upper Carboniferous). From that time onwards during an interval of millions of years up to most recent geological times, there is no record of any rocks being formed.



## TOPOGRAPHY.

Newfoundland is an elevated upland of gently rolling topography. Its highest elevations are in the Long Range Mountains which flank the west coast and overlook the Gulf of St. Lawrence. The highest summits exceed 2,400 feet above sea-level and from this elevation the plateau has a gradual southeast slope to an altitude of about 700 feet in the Avalon Peninsula. A striking feature of the topography is the marked parallelism of the ridges and valleys, giving the island a pronounced NE - SW trend. The coasts are steep and rocky except in the west where there is a low coastal plain. For the purpose of describing the topography the island is divided into three areas:

1. The Northern Peninsula
2. The Southwest Coastal Mountains
3. The High Plateau

### 1. The Northern Peninsula.

The peninsula stretches northwards from Bonne Bay to Cape Bauld, a distance of 180 miles. It is dominated by the Long Range Mountains, an upland surface that is a remnant of one of the ancient peneplain levels to which the whole island was reduced. On the west the peninsula is fringed by a low coastal plain above which the mountains rise by steep scarps to heights of over 2,000 feet. The highest elevations are found along this western edge, and following the general tilt of the island, the upland surface slopes southeastwards towards White Bay. Northwards from the latitude of White Bay there is a general decrease in elevation to about 500 feet.

The summits, which rise above the general level as flat-topped hills and ridges with steep sides, reach heights up to 2,500 feet. Gros Morne, (2,651 ft.) overlooking Bonne Bay at the southern end of the Long Range, is one of the highest points on the island.

The plateau is barren and rocky, with many lakes lying in ice-scoured hollows, and crossed by numerous streams. Erratic boulders and frost-riven rocks cover the surface.



The western and eastern margins of the Long Range are sharply defined by parallel faults which follow the general structural trend of the island. Major faulting occurred during the Appalachian Mountain building period, when the resistant metamorphic rocks, of which the Long Range is built, were thrust westwards over the younger Palaeozoic rocks which underlie the coastal plain. One major fault follows the east coast where the plateau falls abruptly to the sea by rocky cliffs 300 to 500 feet high, and another fault follows the line of the west-facing scarp of the mountains.

The west coast plain is low and flat with elevations seldom exceeding 300 feet. It rises gradually inland towards the steep scarp face of the Long Range. It is crossed by numerous streams flowing in broad shallow valleys and is notable for many lakes which extend across the plain and often reach into the mountains in deep U-shaped glaciated valleys. The surface is covered with glacial drift and underlain with sandstones, limestones and shales.

## 2. The Southwest Coastal Mountains.

The area is bounded on the north by Bonne Bay and the Long Range Mountains and on the east by the steep scarp face of the Southern Long Range. It narrows southwards to Cape Anguille to form a wedge of deeply dissected country characterized by a series of isolated uplands separated by deep fjords and valleys.

On the basis of rock formations the mountains may be further subdivided into two areas:

1. The northern section, the Bay of Islands Range, stretches from St. George's Bay to Bonne Bay, and is underlain by Palaeozoic sedimentary rocks into which were intruded several large igneous masses. These stand out as isolated mountain blocks as they are more resistant to erosion than the sedimentary rocks which surround them. This complex area has been considerably broken up by faulting. The major faults follow the general SW-NE structural trend of



the island and produce the deep lake-filled valleys which parallel the Southern Long Range Mountains. Faults at right angles to this dominant line cut through to the west coast and have given rise to a series of deep, steep-sided transverse valleys which cross the main structural trend of the country.

The Bay of Islands Range includes the Lewis Hills (2,673 ft.), the Blow-me-Down Mountains (2,135 ft.), St. Gregory Highland (2,240 ft.), Table Mountain (2,300 ft.) and Lookout Hills (1,988 ft.). These mountains are notable for their steeply-rising sides and level to gently rolling upper surfaces. Rock basins, glacially rounded forms, and immature drainage are characteristic features.

The arms of Borne Bay and the Bay of Islands, penetrate deep inland as typical fjords, enclosed by steep to sheer cliffs which rise to elevations of 2,000 feet above the level of the water.

2. The southern end of this coastal belt is underlain by sedimentary rocks of Carboniferous age. The Anguille Mountains, separated from the Southern Long Range by the wide valley of the Codroy River, have been described as "an upland surface with a flat-topped summit 1,000 feet above sea-level". The sides of this upland drop by abrupt slopes into the Codroy Valley, and culminate in low cliffs on the seaward side.

Northwards from the Anguille Mountains to the head of St. George's Bay there is a broad coastal plain crossed by several westward-flowing streams.

### 3. The High Plateau.

The High Plateau refers to the whole of the island lying east of the main fault zone which extends from the Codroy Valley, through Grand Lake to White Bay, and includes the Avalon Peninsula.

The plateau surface has a general southeastward slope towards the Atlantic coasts from its highest elevations which lie in the Southern Long Range Mountains. This range, built of resistant rocks, forms the westerly



limit of the High Plateau and is marked by summits which rise to heights between 1,500 and 2,000 feet. Amongst the highest are Table Mountain (1,700 ft.), Mt. Howley (1,530 ft.), Main Topsail (1,822 ft.). The Southern Long Range is gentle in relief, and the only variations in the monotony of its surface are the higher summits and the ice-scoured lake basins.

East of the Southern Long Range the dominant features of the topography are the Annieopsquitch Mountains, which rise 500 feet above the general plateau level to heights of over 2,000 feet above sea-level, and a number of smaller summits, such as Mt. Peyton (1,581 ft.) which rise sharply from the upland surface.

Immature drainage has caused shallow dissection, and the rivers, which wander aimlessly over the surface flow in broad shallow valleys. The whole surface is covered with unnumerable small lakes and bogs which lie in shallow basins. Local variations in relief are caused by ice-scour and by Pleistocene depositions of glacial material.

In general the plateau falls steeply to the sea by sheer cliffs 350 feet to 500 feet high, indented by numerous fjords and bays. The northern and eastern coasts are characterized by numerous islands, drowned valleys, and small rocky peninsulas. There is evidence of greater erosion round the perimeter of the plateau where post-glacial drainage has removed the unconsolidated Pleistocene deposits. This is apparent notably along the south coast, in the Avalon Peninsula, and along the west coast of Trinity Bay. Here the surface, between 500 and 1,000 feet high, is very rocky, with gorge-like valleys and low crags or "tolts".

## DRAINAGE.

The drainage pattern in general shows a close adjustment to structure and the principal rivers flow with a NE - SW trend following the "grain" of the country.

The precursors of the Codroy, Humber, Exploits and Gander Rivers flowed along fault zones or lines of structural weakness. At a later date in the history of the island when the relief was reduced, some of the rivers, such as the Humber and Lomond, assumed their present courses, which cut across the structure. During the latest period of uplift, the west coast rivers were able to maintain their direction and today reach the sea across the region of greatest relief. This uplift also led to stream-capture and some streams appear to flow against the logical direction of drainage. Grand Lake, for example, might be expected to drain into White Bay instead of westwards into Deer Lake.

During the Ice Age, glacial erosion and deposition further disorganized drainage, damming valleys to form many of the present day lakes and scouring others to produce the multitude of fjords which typify the coast-line.

For the purpose of this account, the drainage is described in two areas divided by the Long Range and Southern Long Range Mountains:

1. West Coast
2. High Plateau and Avalon Peninsula

### 1. West Coast.

The lowlands along the West Coast are crossed by many small streams which have their source in the Long Range Mountains overlooking the plain. These streams rise on the plateau-like surface of the Long Range and flow in broad, shallow valleys, before cascading in ice-scoured troughs down the west scarp of the mountains. North of Bonne Bay, on reaching the coast plains, the streams spread into broad and relatively shallow lakes, many of which reach to the sea. Some of



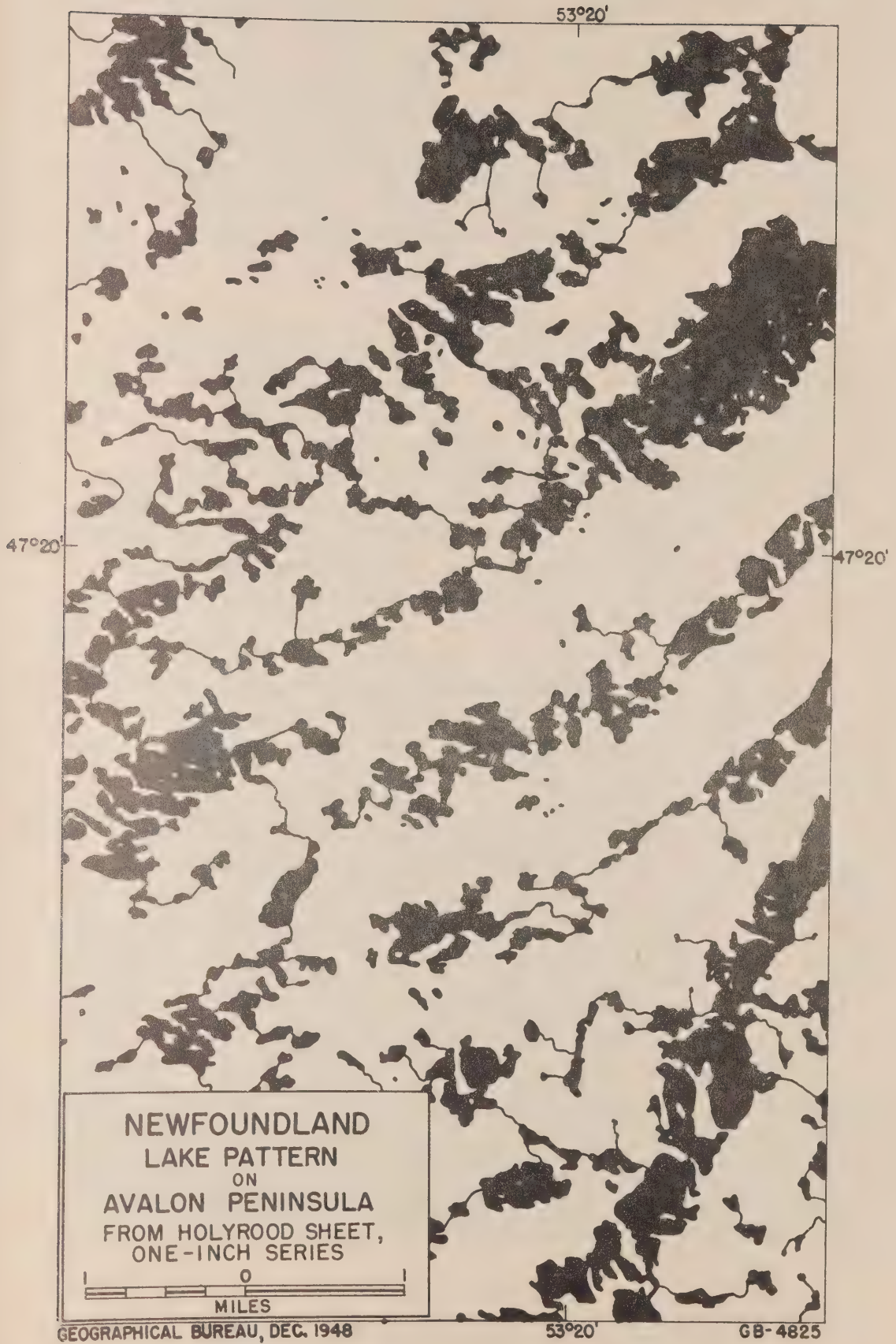


Fig.3.

the coastal lakes extend into the Long Range Scarp in steep-sided glaciated valleys, the walls of which rise in sheer cliffs above the lake surface. Bonne Bay and the Bay of Islands are striking examples of drowned glaciated valleys or fjords. The arms of these fjords cut through the coastal mountains in deep ice-eroded troughs whose cliff-like walls rise nearly 1,000 feet above sea-level. South of the Bay of Islands many of the streams reach the sea in narrow, steep-walled gorges with falls and rapids characterizing their lower reaches.

The Humber and the Codroy are the principal rivers. Their courses follow the general structural trend and they flow parallel to the West Coast. The main branch of the Humber, the Upper Humber River rises near Silver Mountain, which forms part of the east-facing slopes of the Long Range Mountains. The river empties into a number of small lakes along its course and finally drains into Deer Lake, a long narrow lake lying in a faulted depression. Below Deer Lake, the Humber cuts through the coastal mountains in a V-shaped gorge whose sides rise to over 1,500 feet. At the north end of Deer Lake the Humber is joined by the out-flow of water from Grand Lake, which lies parallel to Deer Lake and which, with its extensions, reaches almost from St. George's Bay to White Bay.

The Codroy rises near Codroy Pond and flows SW in a deep, steep-walled valley between the Anguille Mountains and the Southern Long Range. The river meanders in wide curves across a gently undulating valley floor, and in common with many other West Coast rivers, enters the sea through a narrow fjord.

## 2. The High Plateau and Avalon Peninsula.

The drainage pattern in general shows a NE - SW alignment with rivers flowing northeastwards into White Bay, Notre Dame Bay and Bonavista Bay and southwards to the South Coast. Much of the drainage on the High Plateau is indeterminate, and many small streams wander across its surface, their courses marked by numerous small lakes and swamps.

The main watershed delimits the area drained by



the Exploits River into Notre Dame Bay. Red Indian Lake, from which the Exploits River flows, receives water from Lloyds and Victoria Rivers, which rise southwest of the Annieopsquotch Mountains and flow through a string of small lakes. The Exploits, below Red Indian Lake, has a shallow channel in a wide, open valley. Below Badger, the Exploits valley develops and deepens, with sides about 200 feet in height and at Grand Falls the river cascades in a shallow steep-walled gorge. Below Bishop's Falls the river widens and flows into the Bay of Exploits.

Streams flowing to the south coast are short and their lower courses are marked by rapids where they leave the plateau.

Drainage in the Avalon Peninsula is similar in character to that of the High Plateau. Streams are short and swampy and their courses are marked by strings of lakes. Their lower reaches are broken by cascades and waterfalls, some of which have been utilised to provide electric power.



Plate 1. Humber River looking east toward the Humber Gorge. Note forest-cover, bare rocky slopes and level sky-line.



Plate 2. Lower Humber River near Corner Brook, showing the cliff-like sides of the Humber Gorge.



CLIMATE AND WEATHER.

Newfoundland's climate is marine in character but it is less equable than that of Vancouver Island lying in the same latitude. The oceanic influence is modified by the cold Labrador Current which sweeps along the east and west coasts, and by the island's situation to the east of the continental land-mass. The ice-laden waters chill the air above them and tend to set up a barrier against the penetration of warm air masses from the south, and, in winter, cold winds from the continent lower temperatures, particularly on the west coast.

Winds, Temperatures, and Precipitation.

The island lies in the track of cyclonic storms which originate along the plane of discontinuity between cold polar air masses and warm air masses over central and southern areas of the continent. These cyclonic storms move eastwards, in accordance with the general circulation of air masses in these latitudes, and follow a track across the Great Lakes and along the St. Lawrence valley towards the Atlantic. The storms are more frequent and intense in winter when they cross the island every few days and cause considerable variety in the day to day weather. Winds are variable and changes in direction very rapid. Winds from the northwest are dry and cold, those from the northeast are chill and damp, and from the southeast, warm and moist.

Winters are normally long and cold, and summers cool with short warm spells. The mean temperature range is about 40°F. In January there is a difference of 14° between the north and south of the island. The mean January temperature at St. John's is 23°F, 15° colder than Victoria, British Columbia, while at Belle Isle the January mean is only 9°F. Winters tend to be more severe on the west coast and mean temperatures are as much as 5° lower than on the east coast.

In summer there are few places in the island with mean July temperatures above 60°F. August, on the average, is a slightly warmer month but temperatures of 90°F. are unusual. The west coast, in the area of the lower Humber, has the warmest summers with a July mean of 61°F. This factor, combined with the better soil conditions is important from the point of view of agriculture.

Precipitation is abundant and well-distributed throughout the year. Most of the island, except for the northwest coast, has an annual mean in excess of 30 inches. Rainfall is heaviest in the southeast, St. John's having an annual mean of 53.8 inches. In the northwest, snow makes up a quarter of the precipitation. The amount of snow decreases from 120 inches in the north and northeast to 80 inches in the south. In coastal areas high winds during cyclonic storms often carry fine snow or frozen spray. A local phenomenon is the glaze or ice-storm which occurs when warm, moist air from the south brings rain which freezes on contact with the frozen ground.

St. John's.

<u>Month</u>	<u>Temperatures(°F.)</u> <sup>1</sup>			<u>Precipitation(ins.)</u> <sup>2</sup>
	<u>Mean</u> <u>Temp.</u>	<u>Mean</u> <u>Max.</u>	<u>Mean</u> <u>Min.</u>	<u>Mean</u>
Jan.	23	31	16	5.4
Feb.	22	29	15	5.1
Mar.	28	34	21	4.5
Apr.	35	41	29	4.2
May	43	51	35	3.6
June	51	60	42	3.5
July	59	68	50	3.7
Aug.	59	68	52	3.6
Sept.	54	61	46	3.8
Oct.	45	52	39	5.4
Nov.	37	43	31	6.1
Dec.	29	35	23	4.9
Year	41	48	33	53.8

1.- Averages over 50 years

2.- Averages over 50 years broken.



Port Aux Basques.

<u>Month</u>	<u>Temperatures(°F.)</u> <sup>1</sup>			<u>Precipitation(ins.)</u> <sup>1</sup>
	<u>Mean Temp.</u>	<u>Mean Max.</u>	<u>Mean Min.</u>	<u>Mean</u>
Jan.	21	26	15	6.4
Feb.	18	24	11	4.0
Mar.	24	30	19	4.0
Apr.	34	39	29	3.6
May	41	47	35	3.6
June	49	54	43	4.2
July	56	62	51	4.4
Aug.	58	64	53	5.0
Sept.	53	58	47	4.4
Oct.	44	49	39	4.7
Nov.	35	40	31	3.8
Dec.	28	32	23	5.1
Year	38	44	33	53.2

1.- Averages over 10 years

Belle Isle.

<u>Month</u>	<u>Temperatures(°F.)</u> <sup>1</sup>			<u>Precipitation(ins.)</u> <sup>2</sup>
	<u>Mean Temp.</u>	<u>Mean Max.</u>	<u>Mean Min.</u>	<u>Mean</u>
Jan.	9	15	4	2.2
Feb.	12	16	7	2.1
Mar.	19	24	15	3.5
Apr.	27	32	23	2.7
May	35	39	31	2.6
June	42	47	37	5.4
July	51	56	45	5.0
Aug.	53	38	47	6.0
Sept.	47	52	41	5.7
Oct.	38	42	34	6.0
Nov.	28	32	24	3.9
Dec.	16	21	12	2.7
Year	31	36	26	47.6

1.- Averages over 20 years broken

2. - Averages over 10 years

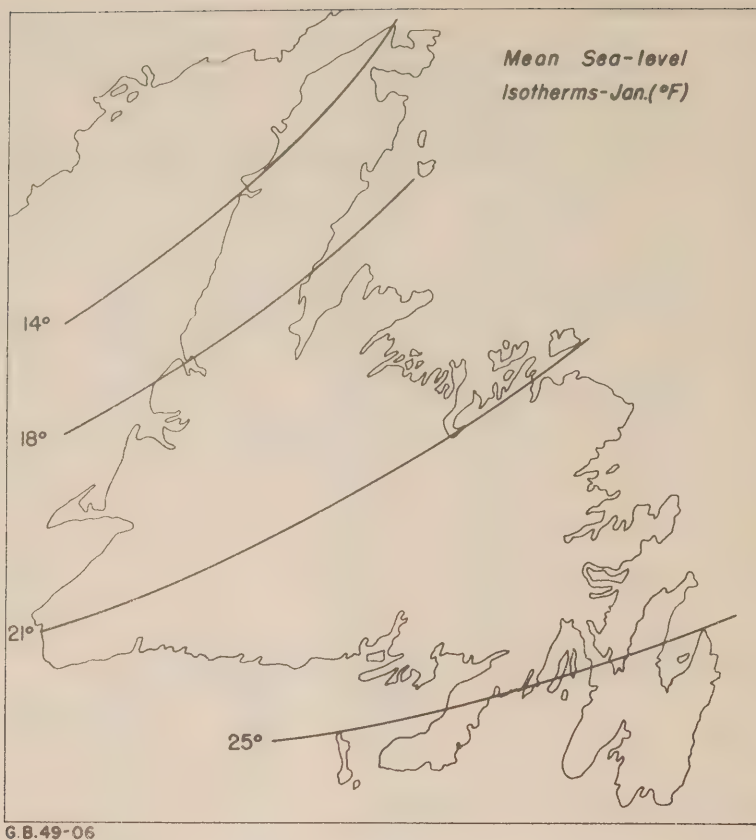


Fig. 4.

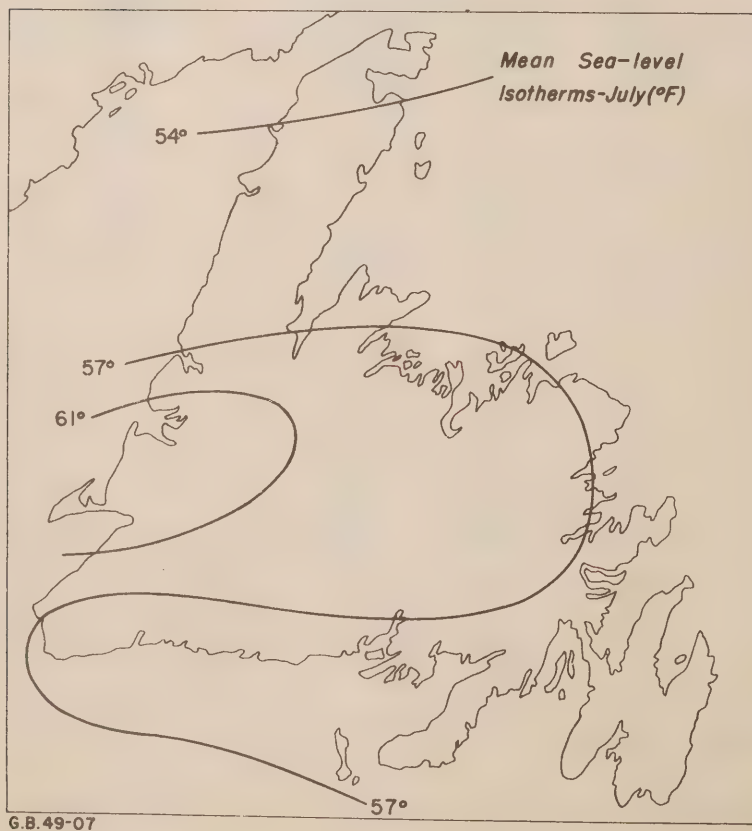
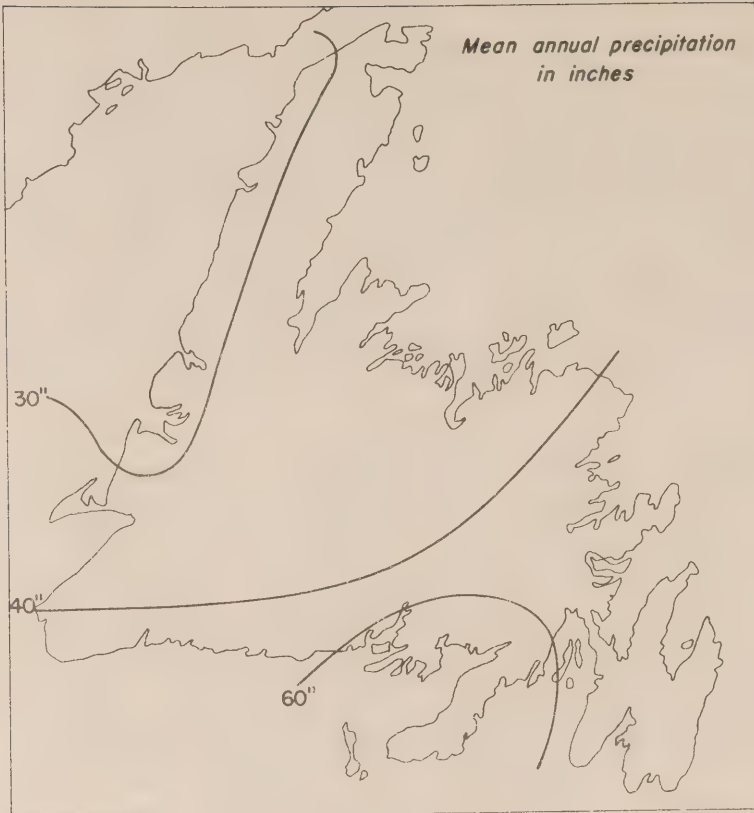


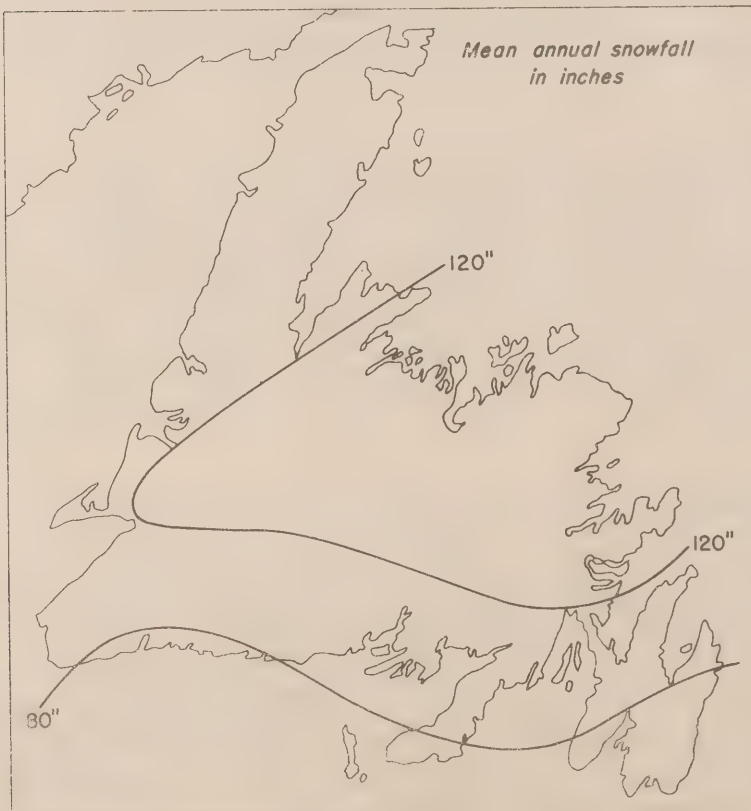
Fig. 5.





G.B.49-08

Fig. 6.



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Fig. 7.

### Fog Conditions.

Newfoundland is less liable to fog than the southeast coast of Nova Scotia, St. John's having an average of 37 foggy days a year, while Halifax has 54. The well known fog region lies over the Grand Banks to the east of the island. Within this area the cold Labrador Current sweeps southward towards the warm Gulf Stream. Warm moist winds, blowing from the southwest off the Gulf Stream, mix with chilled air lying over the Grand Banks and produce heavy but intermittent blankets of fog.

The area of greatest incidence lies between latitudes  $45^{\circ}$  to  $55^{\circ}$  N. and stretches eastwards from the island to  $45^{\circ}$  longitude. Further east, towards mid-ocean, fog prevalence lessens rapidly. Records over the last fifty years show that fog is more prevalent in the summer months. An annual average of 19% of the observations made show fog. June and July are the foggiest months while the period October to March is the least foggy. Observations at stations on the coast of Newfoundland show that the average annual number of days with fog ranges from 103 at Belle Isle to 25 at Rich Point. In most areas, July is the foggiest month; Belle Isle, for example, has a July average of 17 foggy days, while February, the least foggy month, has an average of 2 days.

Southwesterly winds are generally most favourable for fog formation, and the fog forms most freely with light to moderate winds. The height of the fog blankets varies considerably. In summer the coast fogs are more frequent in the morning and least frequent in the afternoon, but in winter the occurrence is less definite. Dense fogs, especially in July, may persist for a full day.

### Ice Conditions.

Ice conditions are of considerable importance to Newfoundland as the seas surrounding the island are the source of one of its main industries, provide a natural highway between coastal settlements and connect it with its world markets. All the year the island is surrounded by ice-cold waters carried southward by the Labrador Current. During the winter months much of the



coastline is closed by ice which seals the harbours and interrupts the coast-wise communications.

During the fall, coastal waters are subject to severe cooling and this chilling effect spreads southwards over the shallow waters covering the Labrador and Newfoundland Banks, and allows the formation of field ice, or sea ice.

In addition to field ice, there is Arctic ice which originates in Davis Strait and Hudson Strait and moves southwards during the fall to reach Cape Chidley, in the extreme north of Labrador, early in November. The ice sweeps down the Labrador coast and reaches Belle Isle during December, often extending as far as 100 miles to the east of Belle Isle Strait. It enters the strait and rapidly fills it, sealing up this northern channel. By January or early February the ice reaches the northern edge of the Grand Banks and closes the east coast of the island. In March it reaches its maximum extent and spreads south to latitude  $45^{\circ}$ , where it is normally open pack ice but is dangerous to navigation.

The south coast of the island is always ice-free and its bays and harbours accessible. Normally, ships can reach St. John's through a narrow coastal passage which is open except during periods of easterly or southeasterly winds when the ice is drifted towards the coast.

The break-up begins during April with the opening of Cabot Strait, though frequently in spring a rush of ice from the Gulf of St. Lawrence causes a block between Cape Ray and Cape Breton Island. The break-up of ice proceeds rapidly during May and by June most of the coast is open. The Labrador coast is not freed until late July.

Icebergs which originate from land ice in the far north, and particularly from the glaciers of the Greenland coast-line are drifted southward towards the Grand Banks by the Arctic currents usually taking two years on their journey. They may be observed south of Newfoundland in any month of the year but are at a maximum during April, May and June. They are at a minimum during November.

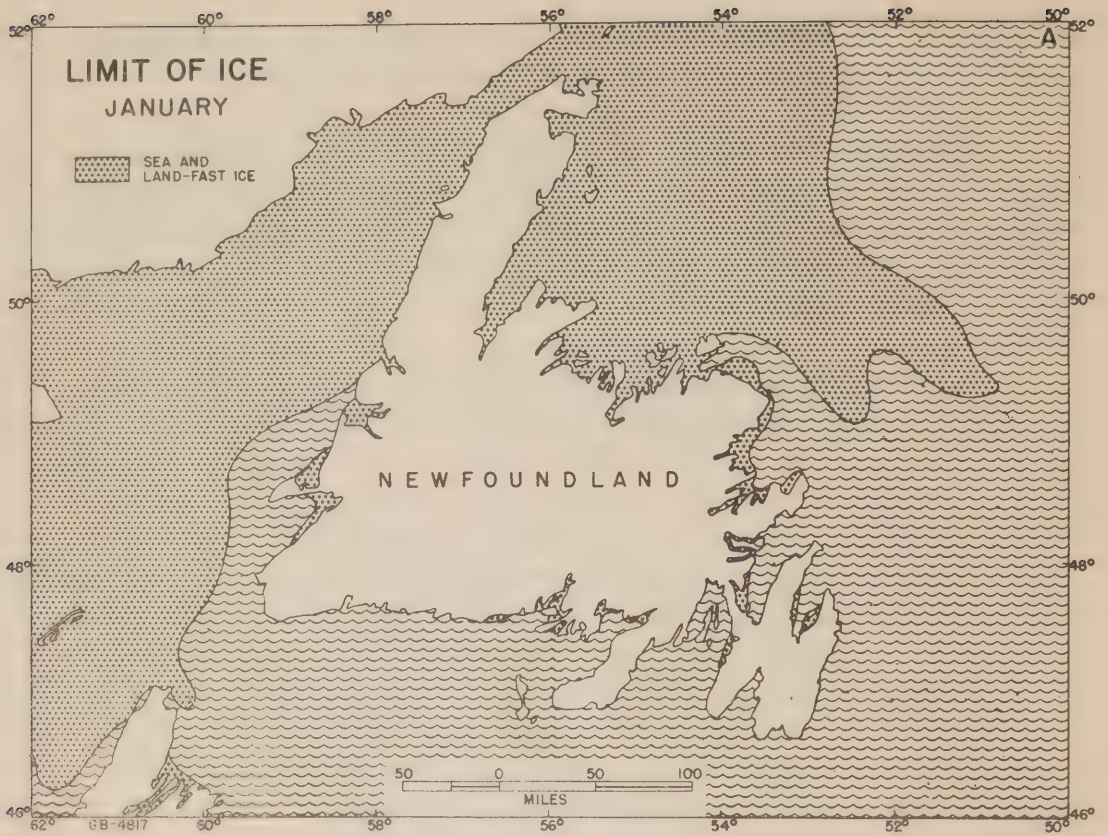
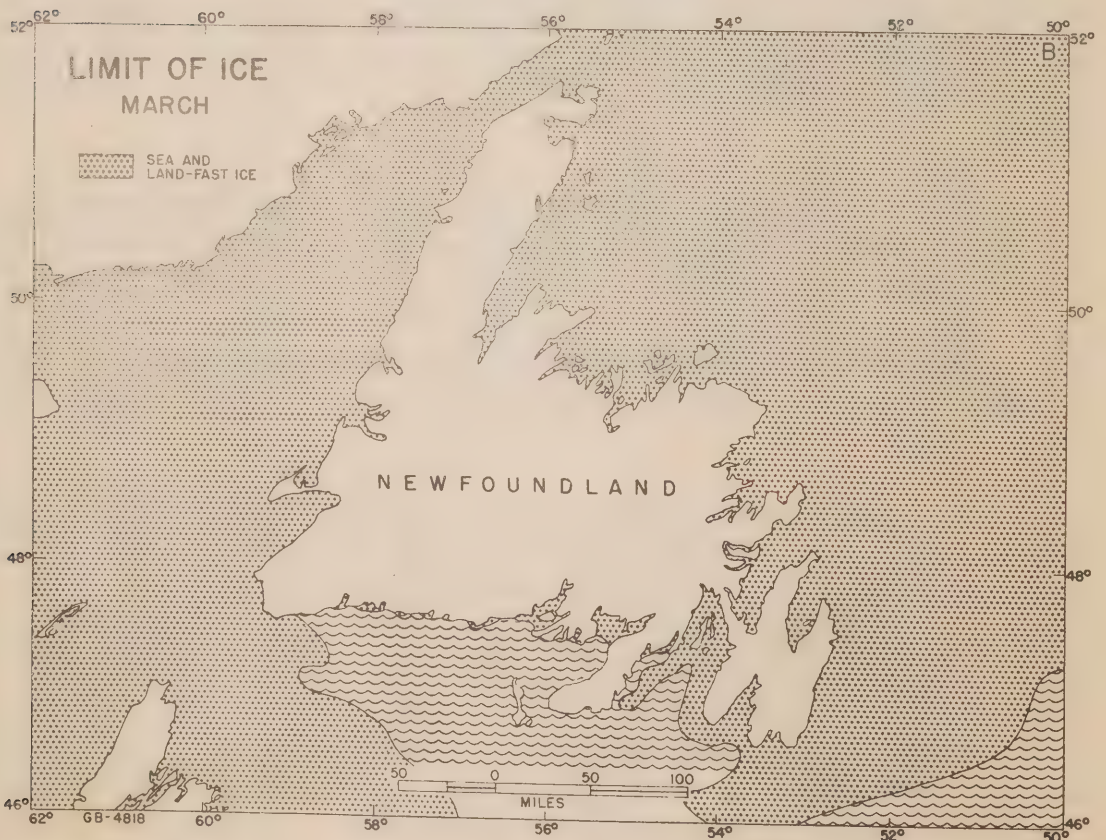


Fig.8.



Series based on the "Ice Atlas of the Northern Hemisphere"

Fig.9.



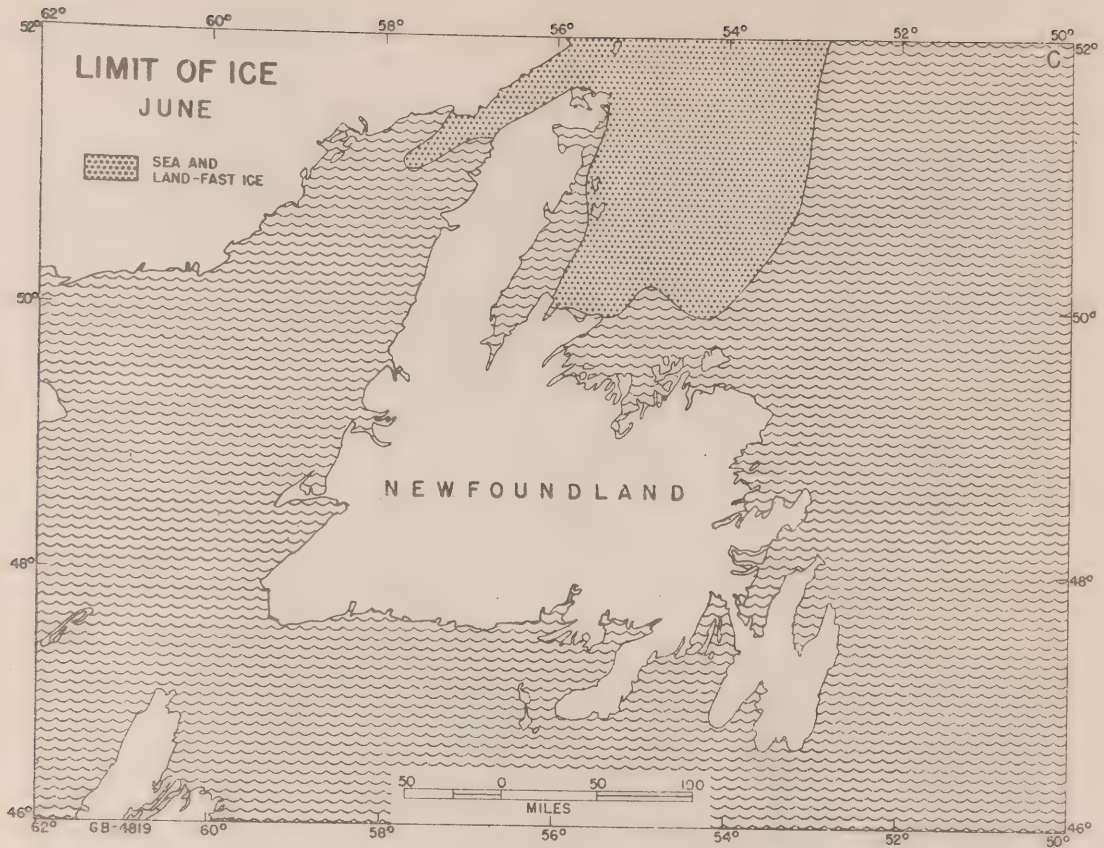
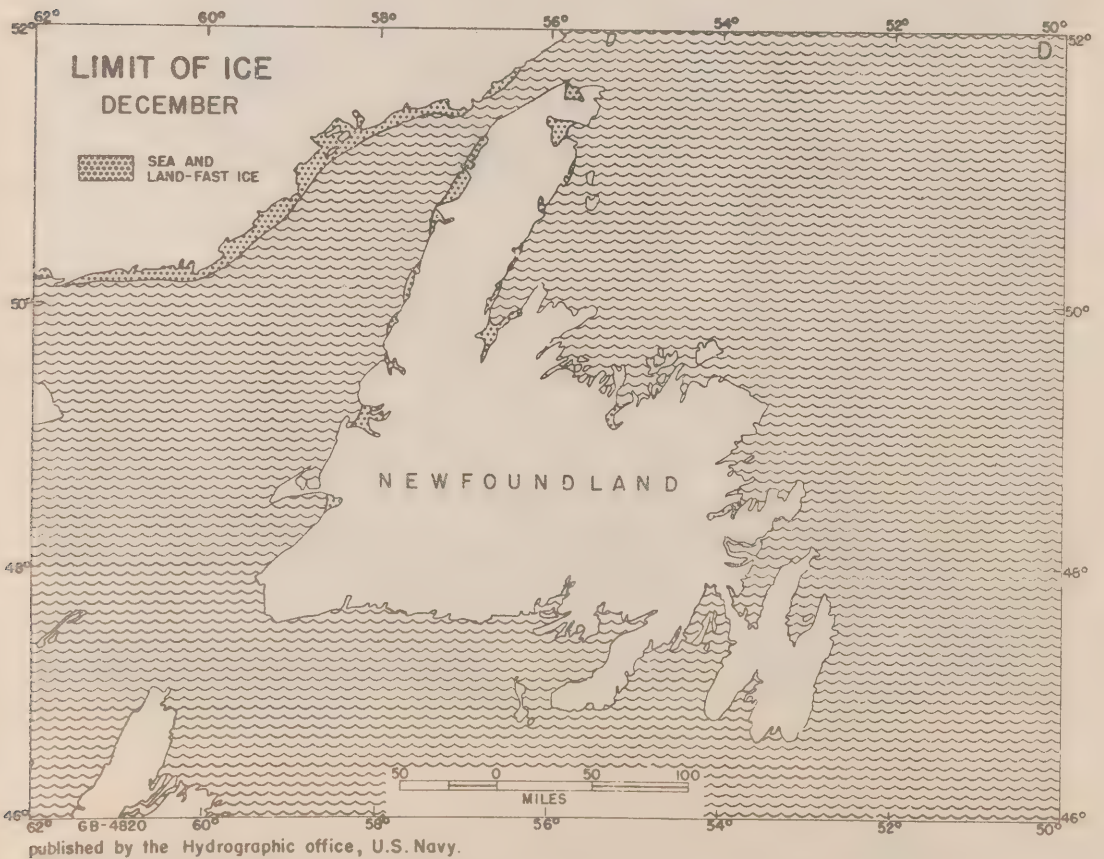


Fig.10.



published by the Hydrographic office, U.S. Navy.

Fig.11.



Plate 3. The rocky east coast of the Avalon Peninsula  
at Petty Harbour, 10 miles south of St. John's.



### NATURAL VEGETATION.

Newfoundland lies within the Boreal Conifer Forest Region and has a forest-cover similar to that of Northern Ontario. This forest type which covers a great part of Canada is mainly coniferous but includes hardwoods such as birch and red maple. The climate is better suited to the conifer; the long cold winter and short growing season of 4 to  $5\frac{1}{2}$  months restrict the spread of deciduous forest.

Central Newfoundland lies 300 miles north of the latitude of Ottawa but, owing to the tempering influence of the sea, the climate is more equitable and favours tree growth. The summer months are cool and humid and winter temperatures are higher than would be expected for the latitude. The rainfall is heavy and well distributed throughout the year. Despite the short growing season, the growth rate is fully equivalent to that of Eastern Canada, though the stature of mature trees is less.

#### Distribution of Forest.

The whole island is by no means forested and as much as one-half of the total land surface is a waste of moss-barren and bog. Of the remaining area, about four-fifths is under productive forest.

Drainage and altitude are the most important factors in the distribution of forest. The main forest areas lie within the watersheds of principal rivers, the Humber, the Exploits, the Gander, and the Terra Nova. In addition there are considerable stands of timber along the rivers which drain into White Bay and St. George's Bay.

The forests are all self-sown and are thus uneven-aged except in clear cut or burnt areas. They regenerate naturally and prolifically in balsam fir in cut-over areas, and in spruce where the forest has been burnt. In certain areas the regeneration is so prolific that the growth rate is seriously retarded within a few years by reason of the denseness of the young growth.

The best forest lands are found on well-drained valley slopes. These are normally mixed forests of balsam

fir, black spruce, white spruce and white pine. On lower slopes and along valley bottoms, where the water-table rises and the ground tends to be swampy and wet, the forest cover is of poorer quality black spruce and balsam fir. The higher plateau surfaces and inter-streams areas are barren with innumerable lakes and bogs and only a thin and very scattered cover of low grade black spruce. At elevations exceeding 1,200 feet, forest cover gives way to tundra or moss-barren.

### Tree Types.

Trees in order of importance are balsam fir (*Abies balsamiae*), white spruce (*Picea glauca*), black spruce (*Picea mariana*), white birch (*Betula papyrifera*), and yellow birch (*Betula lutea*). Typical forests contain a mixture of both softwoods and hardwoods.

### Cover and Site-Type Classification.

The following classification of the vegetation cover is based on Hawley's work in 1929. The site represents the combined effect of climate and soil conditions, and each site-type has a dominant tree assemblage and a characteristic ground vegetation.

#### 1. Trillium.

Dominant trees: Red maple, yellow birch, white spruce and balsam fir. Main locations are lower well-drained valley slopes.

Vegetation includes *Trillium* (lily), *Aspidium* (wood-fern), *Carex* (sedge) and *Viola* (violet).

This site-type is peculiar to the St. George's district.

#### 2. Cornus.

Dominant trees: Balsam fir, white spruce, black spruce, white birch and white pine. Main locations are well-drained valley slopes.



Vegetation includes Cornus (pigeon-berry), Hypnum (feather-moss), Clintonia (snake-berry), Vaccinium (blue-berry) and Kalmia (sheep laurel).

This is the main forest type and comprises about 80% of the productive forest.

### 3. Sphagnum.

Dominant trees: Black spruce and balsam fir.  
Locations are swamps and wet flats at any elevation.

Vegetation includes Sphagnum and associated mosses, Carex (sedge), Cornus (pigeon-berry), Ledum (Labrador tea) and Kalmia (sheep laurel).

### 4. Kalmia-Vaccinium.

Dominant tree: Black spruce. Locations are well-drained flats and upper valley slopes.

Vegetation includes Kalmia (sheep laurel) and Vaccinium (blue-berry).

### 5. Kalmia - Ledum.

Dominant tree: Black spruce. Locations are valley floors and swamps.

Vegetation includes Kalmia (sheep laurel) and Ledum (Labrador tea).

### 6. Cladonia.

Dominant tree: Black spruce. Locations are inter-stream areas, hill tops, barrens.

Vegetation includes Cladonia (reindeer moss) and lichens.

### Bogs and Marsh.

Depressions formed during the glacial epoch became lake-filled hollows, and many of these lakes remain to the present day. They form, together with the marsh and bog,



Fig.12.



a characteristic feature of the landscape. In terms of geological time these lakes are temporary, and gradually become extinct as their shallow basins are filled by the normal processes of deposition. Material is being constantly washed into them and they are slowly being converted into swamps by the sediments which accumulate round the edge and extend inwards finally filling the lake area. Vegetation first grows on the outer rim and then extends towards the centre as the marsh consolidates. Ground vegetation is followed in succession by shrubs and bushes and then by spruce. The final stage is the development of marsh caused by the building up of peat.

There has been some attempt to reclaim these marshes, but the work has met with little success as both clearing and drainage are expensive and laborious and the results do not seem to justify the efforts.



Plate 4. George's Lake, southwest of Corner Brook, looking east over forested lowland towards barren heights rising above the tree-line.

## SOILS.

Pre-glacial soils were entirely removed from the island by the ice during the Wisconsin glacial epoch. As the ice sheet melted, material held in it was deposited over the surface of the island as unsorted glacial gravel. In the main valleys glacial debris was left as stratified silts, sands and gravels.

The plateau surfaces are covered with a veneer of glacial gravels of variable thickness leaving few outcrops of bare rock except where resistant ridges and peaks protrude from the general level. At low elevations round the coasts, particularly at the seaward end of the main valleys, marine deltaic clays and sands were deposited during the period of submergence which followed the glacial epoch.

The development of soils is dependant on climate, biological factors, the composition of the parent rock formations, and the length of time the forces of soil development have acted on the original material. Owing to the recency of glaciation, true soils have had little time to develop and are consequently very shallow. The cool, moist climate has been a further factor in retarding soil development. As the rainfall is heavy and the evaporation rate low, there is at all times much water percolating in the soil leaching out the soluble mineral salts, with the result that soils are extremely acid. Further, the general vegetation cover of coniferous forest gives rise to acid soils. Soils formed under these conditions belong to the Podsol group of soils and need considerable amounts of lime, phosphates, and organic matter to render them fertile.

Variety in the soils of Newfoundland has been produced by differences in the parent rock formations. Along the west coast there are younger Silurian and Carboniferous rocks covered by relatively good soils, but east of the Long Range Mountains where the bed rock is of a crystalline nature the soils are highly acid and unfertile. The highest elevations lack soil cover and the surface is bare rock with many erratic boulders and frost-riven chips of rocks.



The surface of the high plateau has a general cover of glacial gravels and sands of variable depth. Peat bogs form in ice-scoured hollows. The valley soils include glacial boulder gravels, outwash sands, gravels and clays and recently formed alluvial soils. The seaward end of many valleys and some portions of the coast have deposits of marine and lacustrine sands and clays. The coastal fringe of the plateau is in general without soil cover, as there has been considerable post-glacial erosion.

The Pleistocene gravels, which are everywhere abundant, are coarse in texture, with boulders of all sizes, and are frequently overlain by unstratified sands. They are extremely porous and thus subject to constant leaching during rainy periods and dry out quickly during drought.

Soil surveys<sup>\*</sup> are being undertaken, but little of the island has as yet been covered. The chief areas surveyed are those with agricultural potentiality and are confined to the upper Humber Valley, Deer Lake, the Codroy Valley, Grand Falls, the northwest coast and St. Mary's Bay.

\* - Soil surveys by the Agricultural Division of the Department of Natural Resources, Newfoundland.

NATURAL RESOURCES AND ECONOMIC DEVELOPMENT.

Newfoundland's economy is based primarily on three extractive industries, fishing, forestry and mining. Traditionally her basic industry always has been the fisheries and for four centuries was the island's only industry. During the course of this century both forestry and mining have increased in importance and though at the present time the pulp and paper industry contributes as much to the national income as the fisheries, the latter industry is still the most important factor in the social and economic structure of the island. Agriculture is a subsidiary industry. Waterpower resources, though substantial, have not yet been fully developed.

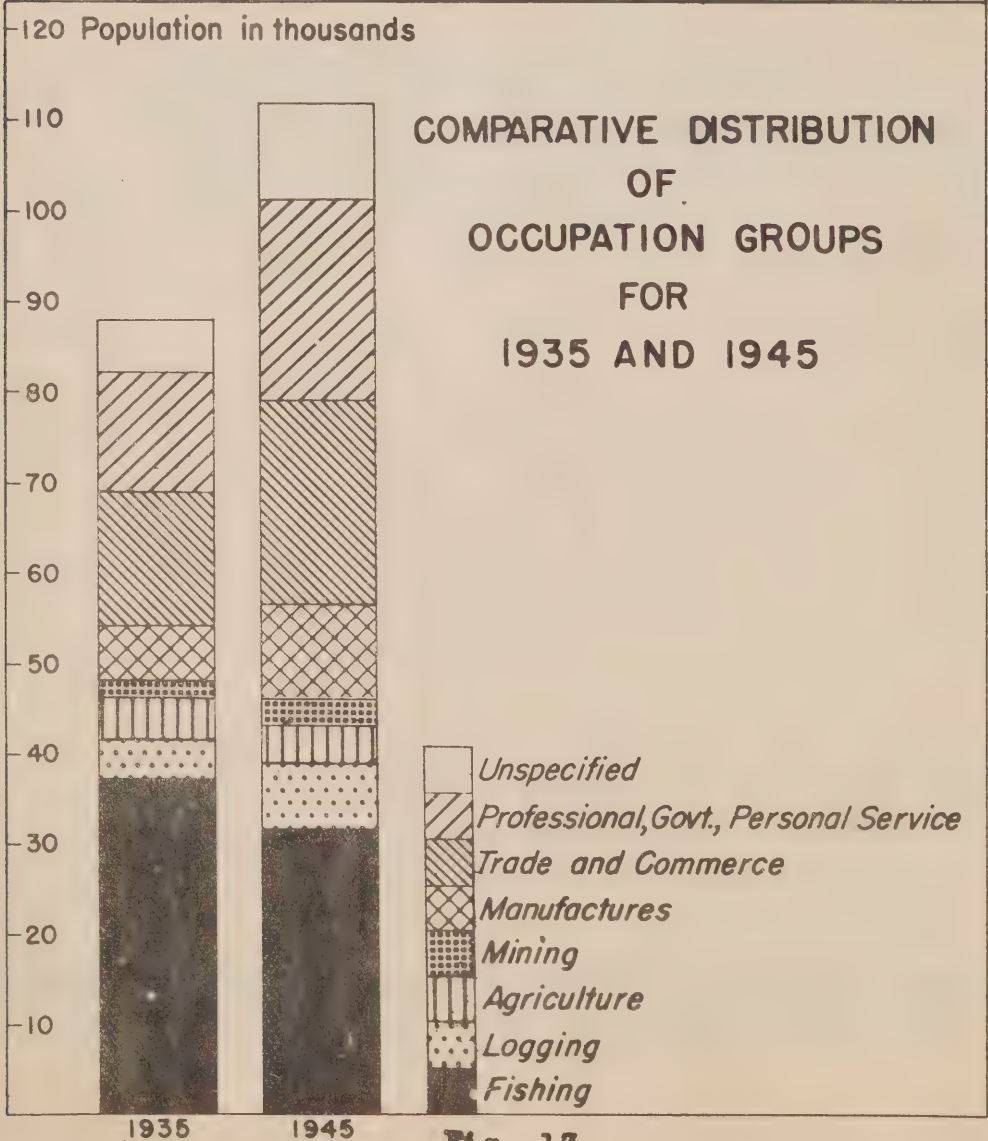


Fig. 13.



## FORESTRY.

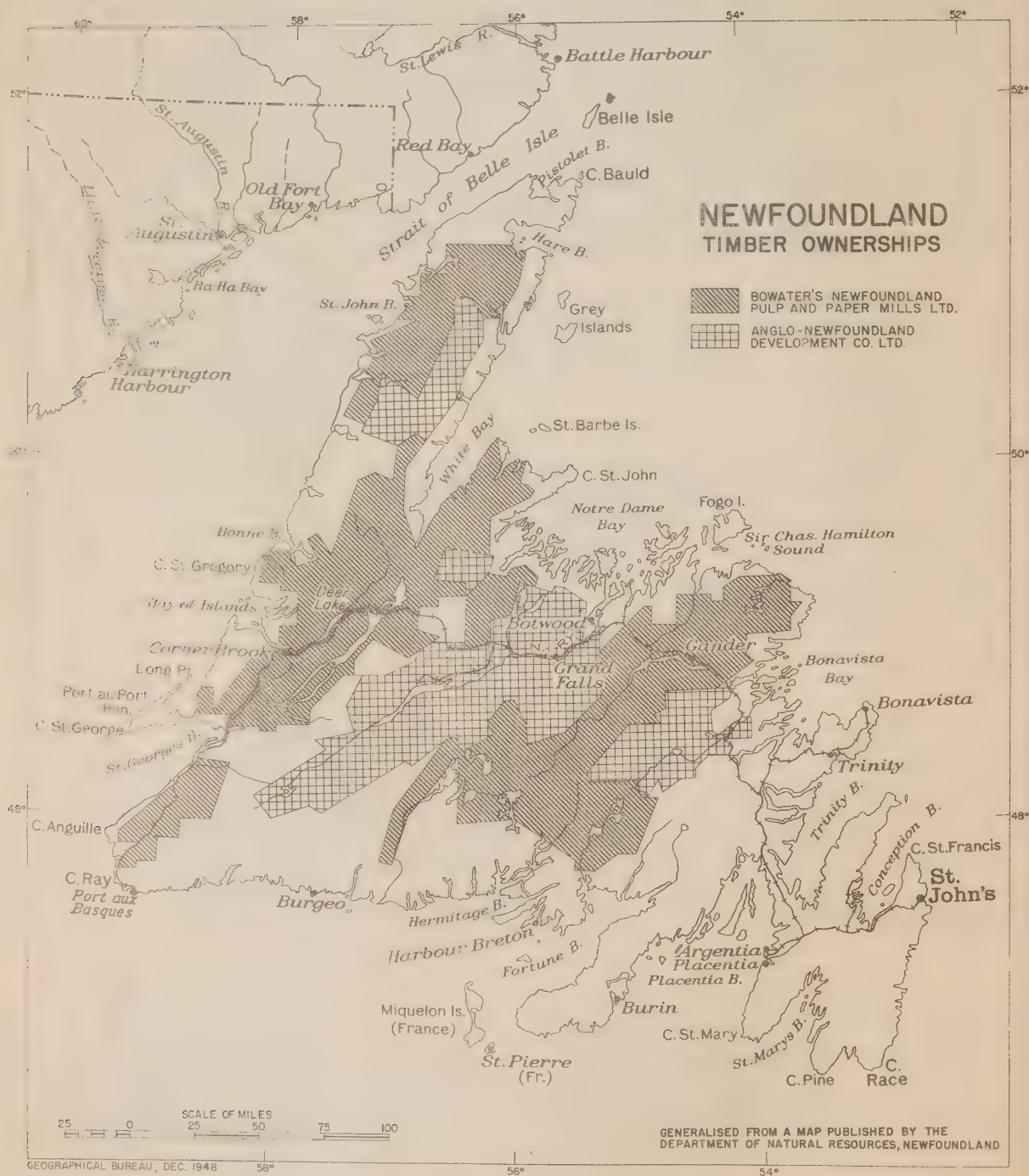
Newfoundland's forests are one of her most important natural resources and, after the fisheries, provide her chief source of revenue and employment. The total land area (excluding water surfaces) is 37,000 square miles, and of this area it is estimated<sup>x</sup> that 47% or 17,150 square miles is forested. The remainder of the surface is non-productive or waste land comprising bogs, barrens or scrub covered land. Only about 83% or 14,400 square miles of the forested areas are classed as exploitable forest.

About three-quarters of the forests are private in which the right to cut timber is leased or licensed to individuals or corporations. The remainder, about 4,000 square miles is state forest and lies mainly round the perimeter of the island. The private forests, owned mainly by two major companies, lie in the watersheds of the Exploits, Gander, Humber and Terra Nova Rivers, and along the west coast. The Newfoundland Government controls a three mile wide belt round the whole coast for local cutting but much of the coast is bare and rocky and a great part of this forest is depleted.

It has been estimated that, barring serious depletion by fire, there is sufficient timber for normal cutting in perpetuity as cut-over areas regenerate naturally and trees grow well under the humid climate conditions. Owing to low temperatures and strong winds, however, they do not attain large proportions and are inferior to the trees of Eastern Canada.

Productive forest is found on the better-drained valley slopes, and is normally mixed forests of both softwoods and hardwoods with balsam fir, white spruce and birch predominating. The higher plateau surfaces or inter-stream areas are barren and covered with innumerable lakes and bogs. Black spruce of low quality

x - Newfoundland, Dept. of Nat. Res., For. Divn.,  
Empire Forests and the War. (St. John's) c.1946.





occurs in these areas but is classed as non-productive forest. Valley bottoms tend to be water-logged and boggy with little timber of merchantable quality. It has been estimated that nearly 50% of the land held by the two major companies comprises such waste or non-productive land.<sup>x</sup>

Growth rate on well-drained soils averages 40 cubic feet per acre. On upper slopes where the soil is drier and less fertile, growth rate drops to 15 cubic feet per acre, while on valley bottoms it is only 5 cubic feet per acre.

Nearly half of the productive forest is undisturbed virgin forest where the annual increment is balanced by mortality.

Forest fires are a considerable danger and over 2,000 square miles have been burnt, mainly in areas bordering the railway. A forest fire patrol has been organized by the Department of Natural Resources and operates along the eastern division of the railway. Poor communications seem to be a serious disadvantage to extensive patrolling.

The main uses of the forest are three-fold:-

1. To provide revenue by the export of paper and pulp.
2. To provide sawn lumber for local use in building.
3. To provide fuel, as the whole population excepting the larger towns depends on local forests for fuel.

Spruce and fir are used in the manufacture of pulp and paper and for sawn lumber. Birch is used as fuel and of recent years has been substituted for spruce in making railway ties.

x - Robertson, W.M. Silviculture in Newfoundland. Canada, Dept. of Mines and Res., Lands, Parks, and Forests Br., Dom. For. Serv. Ottawa, 1946.

### Future Operation.

Although the forests regenerate naturally and prolifically after clear cutting, it is apparent that the present forests are not being utilized to the best advantage. To ensure their better use and future supplies of good quality timber, a programme of forest management is being considered by the government and the private companies. Aerial surveys are being carried out for the purpose of mapping the ground cover and assessing the supplies of available timber. Selective cutting in place of clear cutting is being tried in experimental plots. The government has also set up a forest nursery at Salmonier for the production of seedling trees and has inaugurated a programme of re-afforestation.

Timber Inventory (estimated for 1942 and compiled from surveys by the Department of Natural Resources and private companies).

Bowater's Newfoundland Ltd.	19,977,860 cords	52%
Anglo-Newfoundland Development Company, Ltd.	11,341,597 "	29%
Private Holdings	2,370,871 "	6%
Crown Holdings	4,860,901 "	13%

### FOREST INDUSTRIES.

There is some lumbering carried on in Newfoundland but the bulk of the timber cut is used in the pulp and paper industry which can utilize small diameter logs with little other commercial value.

### Pulp and Paper Industry.

Between 1890 and 1911 there was a considerable export of lumber from Newfoundland from sawmills operating chiefly in the Exploits Valley. Following the development of the paper mill at Grand Falls by the Anglo-Newfoundland Development Company in 1909, and later the Bowater's Mill at Corner Brook in 1925, the export of lumber ceased and the logs were consumed locally in the manufacture of newsprint.





Fig.15.

The industry has the advantages of accessible timber, cheap hydro-electricity, transport of logs by water, and a plentiful supply of labour.

Grand Falls is situated near the mouth of the Exploits River and has developed by reason of the falls which have a power production of 70,500 h.p., and a further potential of 70,000 h.p. The power plant and the mill are situated on the north bank of the river, and a modern, well-planned town to house the employees of the company has been built on rising ground above the river. The company also operates at Bishop's Falls just below Grand Falls, and both these centres are connected by private railway to Botwood, the shipping point at the head of the Bay of Exploits.

The main logging area of the A.N.D. Co. lies within the watershed of the Exploits River and the mill is well located to collect logs carried down by the river and its tributary streams. The mill produces newsprint, sulphite pulp and miscellaneous papers with an average daily output of 700 tons. At present 80% of the timber is ground into pulp for the production of newsprint and 20% chipped and made into sulphite pulp.

The Bowater's Mill at Corner Brook is situated on the Humber estuary and is practically at tidewater with the result that the problem of shipping is greatly simplified. The bay freezes over from January to the end of April and during this period the mill's products are shipped by rail to Port aux Basques which remains ice-free all the year. Logs consumed by the Corner Brook plant are floated down the Humber and its tributary streams. Formerly timber from White Bay and the Northern Peninsula was towed by sea round Cape Bauld and along the West coast to the Humber estuary. Today, this circuitous route has been by-passed by the construction of a new road between Hampden, at the head of White Bay, and Sandy Lake. The logs are transported over this road in specially constructed vehicles and dumped into Sandy Lake, whence they float to Corner Brook.

The milling town is situated on the south side of Humber Arm close by the town of Humbermouth. The mill manufactures newsprint, sulphite pulp and miscellaneous papers and has a daily output of 900 tons.



Power is supplied by a hydro electric plant located at Deer Lake 30 miles northeast of Corner Brook. The plant generates 156,000 h.p. and is the largest in Newfoundland.

The following summary is of production and export of forest products for the period 1938-1947.

	<u>Production</u>	<u>Exports</u>		
	<u>Lumber (f.b.m.) x</u>	<u>Newsprint (short tons)</u>	<u>Pit Props (cords)</u>	<u>Pulpwood (cords)</u>
1938	29,440,000	323,724	45,389	103,811
1939	30,865,000	282,193	51,264	94,948
1940	27,265,000	346,121	55,178	60,453
1941	42,384,000	351,897	87,499	60,503
1942	40,160,000	307,138	Nil	Nil
1943	54,246,000	251,536	9,220	Nil
1944	56,694,000	253,311	16,834	Nil
1945	51,183,000	308,878	20,147	862
1946	63,976,000	No figures	19,147	10,415
1947	68,315,000	376,000	25,145	12,650

### Employment.

Over the last ten years, the paper and pulp companies have provided employment for an annual average of 3,700 men in forest operations and 3,100 in milling operations. The latter figure remains fairly constant throughout the year while the number of men employed in logging varies considerably showing a maximum in the fall when most of the cutting is done.

### Lumber Industry.

The sawmill industry is carried on by about 900 mills operating mainly on the west coast and the east coast northwards of Bonavista Bay and employs an average of about 3,000 men. The output varies considerably. In 1939 it totalled nearly 31 million board feet

x - f.b.m. = Foot board measure.

of lumber, whilst in 1943, with increased war-time demand, the total production was 54 million. The lumber is all used locally, in the main for building. There are some wood-working factories producing furniture, barrels and casks, and in small yards on the coasts there is some ship-building. However, there is no well-developed industry or export of manufactured wood products.



Plate 5. Corner Brook, looking north across Humber Arm showing the well-planned town, Bowater's Mill, and the wharves.





Plate 6. Quidi Vidi, a small fishing village close by St. John's, showing the cluster of wood frame houses and rocky nature of coast.






Plate 7. Flat Rock, a fishing village near Torbay on Avalon Peninsula. View looking south showing gently shelving rocky coast and the "flakes" for drying cod.

# NEWFOUNDLAND AND COAST OF LABRADOR

## FISHING AREAS

### LEGEND

-  COD-BANK FISHING
-  COD-LABRADOR STATION FISHING
-  COD-NEWFOUNDLAND SHORE FISHING

.... HALIBUT FISHING

● HERRING FISHING

○ SQUID FISHING

SALMON FISHING  
ALL AROUND COAST

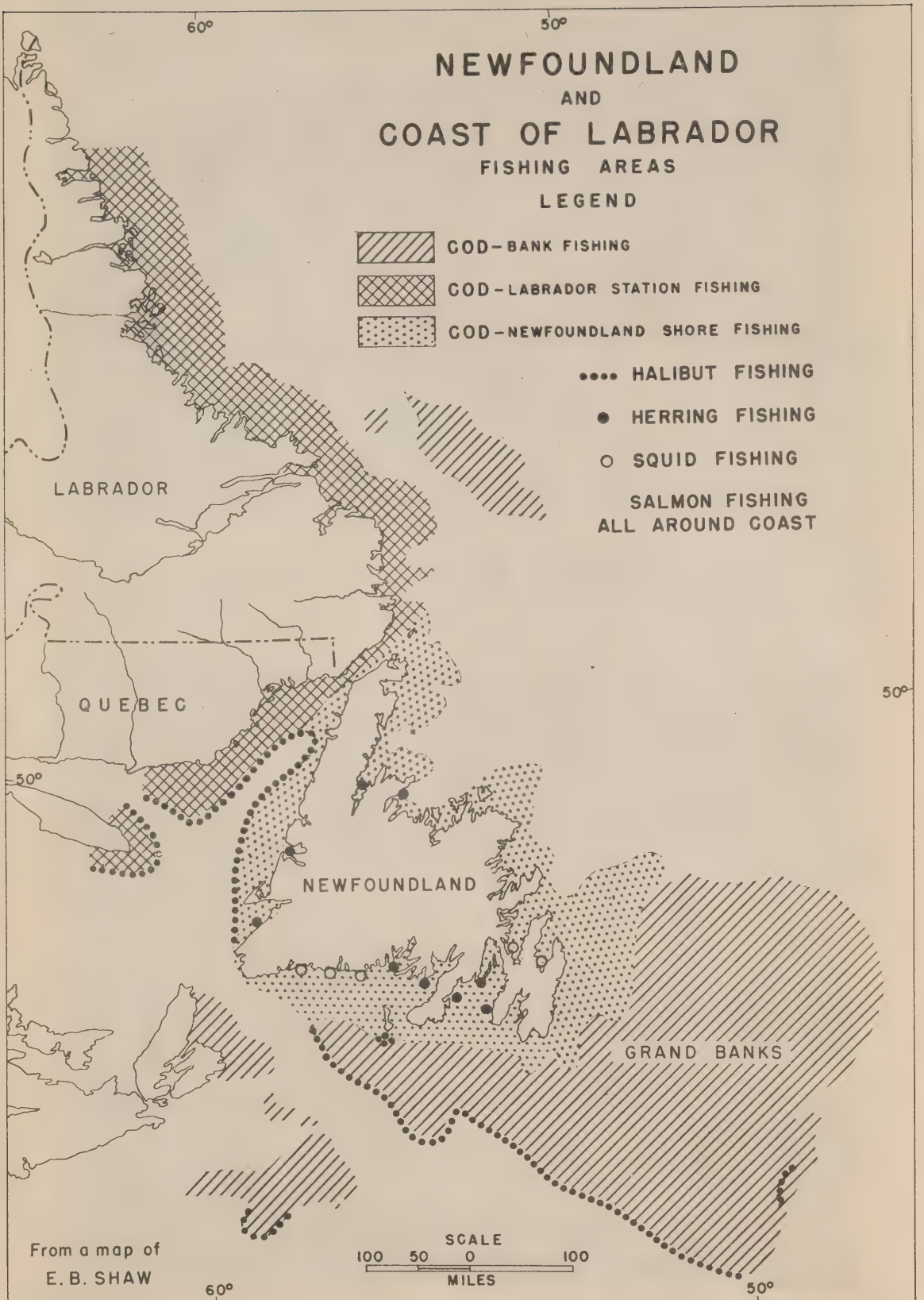


Fig.16.



## FISHERY.

The seas surrounding Newfoundland are one of the world's most prolific fishing grounds. They contain a variety of fish, but are noted in particular for cod. The island lies on the edge of a submerged plateau or tableland covered by shallow water varying in depth from about 30 fathoms to 100 fathoms. The shallowness of the water allows the penetration of sunlight and this encourages the growth of plankton, a vegetable organism on which squid, caplin and herring feed. These fish are the prey of the cod. A further factor encouraging a rich and varied marine life are the cold waters which course over the banks, as these submerged plateaux are called. The cold Labrador current chills the seas and provides admirable conditions of both temperature and salinity for the breeding of these species of fish.

The Banks attracted fishermen from Western Europe as early as the Sixteenth Century, but it was not until the close of the Eighteenth Century that a permanent settlement of fishermen began on the island. Fishing has always been the main occupation of the Newfoundlanders and even today occupies more people than any other industry. The numbers engaged have declined during the course of this century from 65,000 in 1921 to 37,000 in 1935, and to 32,000 in 1945, but this latter figure represents 33% of the gainfully occupied males. Changes in technology during the last quarter of the Nineteenth Century had their effect in Newfoundland, and these developments encouraged the growth of competitive industries in the island. The building of the trans-insular railway in 1896 opened up the interior and the development of the mining and forestry resources began.

### Types of Fishing.

The industry has a number of branches but the whole structure centres round the production of dried codfish which today represents 50% of the total value of all fish exports. Prior to 1939 it represented as much as two-thirds of the total value.

The cod fishery is divided into three types:

- (a) In-shore fishery
- (b) Labrador fishery
- (c) Deep-sea or Bank fishery

(a) In-shore Fishery.

This is carried on all round the coast and particularly from the east and south coasts. It is the most important branch of the cod fishery and employs the greatest number of workers. The shore fisherman operates as an individual unit and fishes close to his home, going to the fishing grounds each day in a small dory or motor-boat and returning each night with his catch. This is a precarious livelihood, dependent on the weather and on the movements of the fish. The fisherman is not able to follow them at sea and relies on the cod being attracted by the caplin that spawn close in-shore early in June. The season lasts from June to October, with the greatest catch in June and July.

Normally the fish are dried and cured on shore by the fisherman himself. After salting they are spread out to dry on the wooden stages or "flakes" which are a characteristic feature of the fishing village.

(b) The Labrador Fishery.

This is mainly an in-shore fishery and is carried on by Newfoundlanders who travel to the Labrador coast each summer, and by a small number of resident fishermen. Fishing begins in July, when the ice has left the coast, and may continue until October. There is also some fishing by schooners on the Banks off-shore. The fish are salted on board and stowed, the vessel returning to port when the catch is completed.

(c) The Deep-sea or Banks Fishery.

This fishery is conducted by schooners of up to 150 tons which make about three voyages to the Grand Banks each season, chiefly from the ice-





Plate 8. Pouch Cove, near Cape St. Francis, showing wooden platforms onto which the fish are off-loaded from the fishing boats.



Plate 9. Fish-drying "flakes" at Pouch Cove.

free ports on the south coast. The ships have a complement of 20 to 24 men who carry on the fishing from the parent vessel in small dories and return to the ship each day with their catch. The work is arduous and hazardous as the dories are in constant danger of being separated from the parent vessel during fog or heavy weather. The catch is salted and stowed on board, and dried and cured on shore.

#### Salmon and Lobster Fishery.

This is a minor branch of the industry, the export value of the fresh and tinned product total-ling about  $1\frac{1}{2}$  million dollars in 1946. The lobsters are trapped mainly on the south and west coasts and the bulk of the catch is exported fresh to Canada and the United States. Salmon are taken in nets close in-shore early in spring and most of the catch is exported to Canada.

#### Whaling and Sealing.

Both these activities declined considerably from their peak in the middle of the Nineteenth Century, but since the recent war, the world demand for oils has lead to a substantial increase, with 750 whales landed during 1948 and 142,000 seals caught. Whaling operations last year were carried out by two whale factories using six whale-catching ships. Sealing takes place in early spring before the fishing season starts and the seals are hunted on the ice off the South Labrador coast over a period of 6 to 8 weeks.

#### Bait Depots.

The establishment of these depots is a recent government innovation and dates from 1936. Since then 15 have been established on the south and east coasts. The herring, squid and caplin bait is kept in cold storage and some is distributed to ships at sea by a modern refrigeration ship.

The Newfoundland Fisheries Board, instituted by the government in 1936, has played a considerable



part in reorganizing the fishing industry, and has done much to regulate the trade and raise the standard of the export products.

Exports of Fish and Fishery Products.

	<u>1946</u>	<u>1947</u>
Codfish, salted	\$ 17,669,000	\$ 13,787,000
Codfish, fresh	5,101,000	1,550,000
Herring, cured and fresh	4,779,000	2,314,000
Salmon, fresh	807,000	603,000
Lobster, fresh and canned	956,000	850,000
Seal skins	121,000	380,000
Oils (whale, cod, seal, etc.)	2,535,000	4,341,000
Other fish products	<u>1,871,000</u>	<u>2,458,000</u>
<u>Totals</u>	<u>\$ 33,839,000</u>	<u>\$ 26,283,000</u>

Figures taken from the Newfoundland, Department of Natural Resources, Newfoundland Fisheries Board, Reports for the years 1946 and 1947.

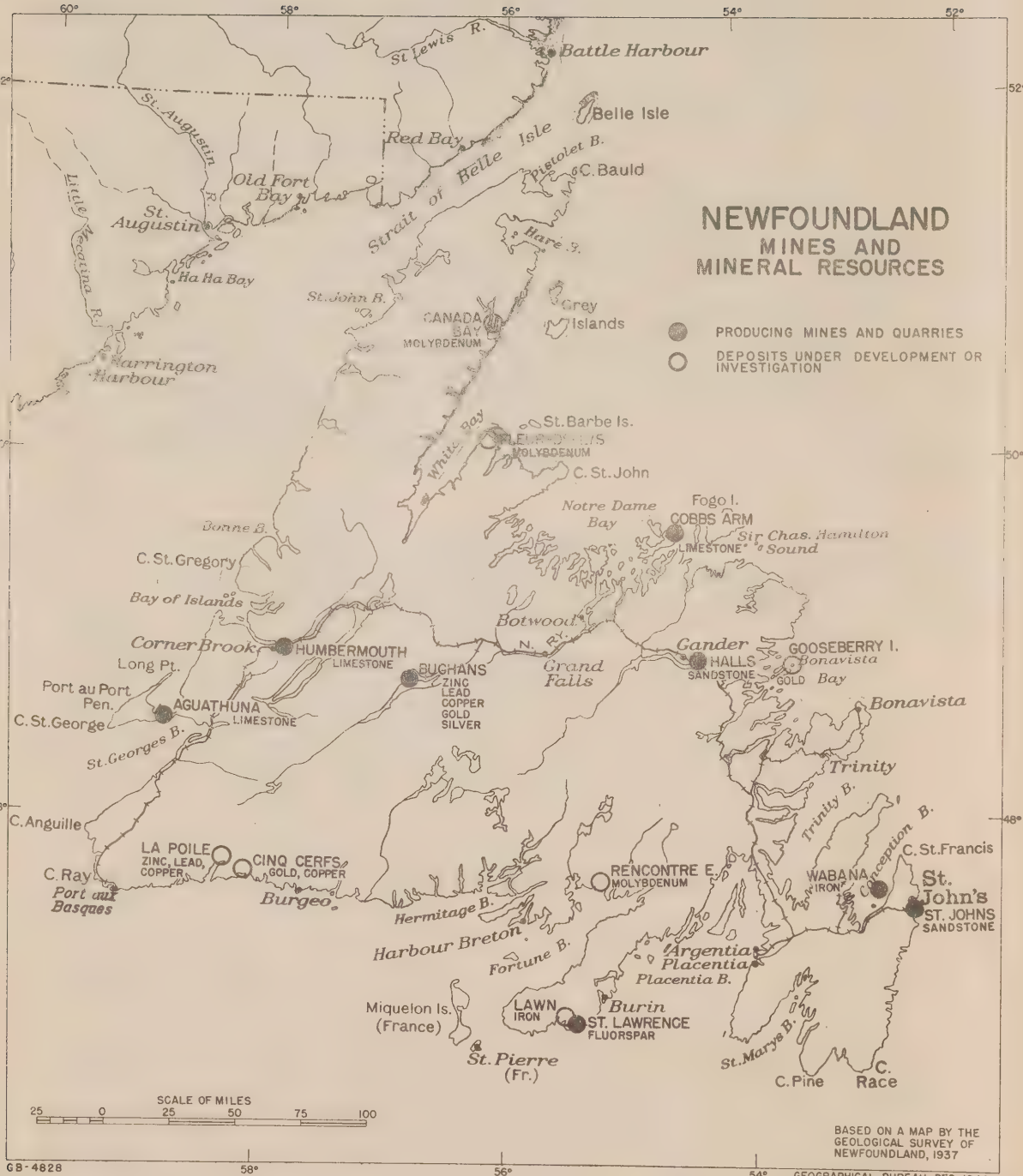


Fig. 17.



## MINERALS AND MINING.

The exploitation of mineral wealth has, during the course of this century, become one of Newfoundland's three main industries, and the export of minerals during the last ten years has accounted for between 20% and 25% of her total exports. The industry is extractive only and the products are exported, with the result that it is dependent on the state of world markets and the demand for mineral ores. Coal has not been exploited commercially and there is no smelting industry in Newfoundland. The island is well endowed with minerals but the development of mining has been hindered by the considerable capital expenditure required, and there are today only two major producing centres. Minerals, such as coal, lead, zinc and iron are found in areas of sedimentary rocks. Where there has been volcanic activity other metals may be found in association with the crystalline rocks so formed. These deposits may include copper, nickel and chromium within the igneous rocks; copper, iron and tungsten in adjacent rocks; and a great variety of deposits in veins occupying fractures associated with the igneous activities. These may include gold, tin, iron, copper, silver, zinc, lead, antimony and mercury.

The Precambrian rocks of the Long Range Mountains consist of belts of granite, schists and gneisses, but have little economic value. Similarly the east coast series are poor in economic products except for building materials, even though there has been considerable volcanic activity.

Sedimentary rocks of the Ordovician period underlie the main part of the island east of the Long Range Mountains and contain a number of economic deposits including the Wabana iron ores at Bell Island and the silver, lead, zinc association of minerals at Buchans. Within the Ordovician rocks there are extensive intrusions of igneous rocks ranging in age from Lower to the Middle Palaeozoic periods. These rocks contain chromite, nickel-copper, asbestos and lead-zinc-copper but these deposits have not been developed.

Rock formations of Carboniferous age are found in the St. George's Bay area and in a synclinal fold stretching between Deer Lake and White Bay. There are Coal Measures in both areas but the seams are folded and tilt steeply, with the result that mining would be too costly to be economic and the coal has remained undeveloped.

#### The Bell Island Mines.

The Wabana iron ore deposits (red hematite) of Bell Island, Conception Bay are Newfoundland's greatest known mineral asset and are also one of the largest known deposits in the world. The red sandstones were first noted by the geologist G.B. Jukes in 1840 but it was not until 1892 that the rocks were identified as hematite. The following year mining operations were commenced and in 1895 the first cargo of iron ore was shipped from Wabana. Since 1899 the mines have been developed and operated by the same interests as the steel industry in Sydney, Nova Scotia, and this plant has taken more than 50% of the 40 million tons of ore that have been extracted. Between the two world wars Germany was the greatest single importer and only a small quantity went to the United Kingdom and the United States. Since 1939 exports have been maintained at a high level, despite the disappearance of the German market, by increased shipments to the United Kingdom.

The production of ore varies from year to year as the industry, based entirely on export, is dependant on foreign markets. Exports to Canada are confined to the Sydney plant, as blast furnaces elsewhere in Canada are based on Lake Superior ores, which can be shipped more economically and have also a lower silica and phosphorus content.

Bell Island, about 6 miles long and 2 miles wide, is built of Ordovician sandstone and shales overlying Cambrian formations. The beds dip gently north-west and continue below the floor of Conception Bay. The workable beds are mined on the north-west side of the island and mining operations have been extended in submarine workings under Conception Bay for a distance of  $2\frac{1}{2}$  miles.



The reserves of iron ore within the limits of submarine mining have been estimated at 2,500 million tons. The figures are based on geological data only and are very approximate as other estimates have been as high as 10,000 million tons.

### Production of Iron Ore.

<u>000's Long Tons</u>		<u>000's Long Tons</u>	
1938	1661	1943	812
1939	1404	1944	585
1940	1409	1945	989
1941	1182	1946	1235
1942	866	1947	1280

### The Buchans Mine.

The Buchans ore deposit was found in 1905 and mining by shafts was developed, but operations ceased in 1911 owing to milling difficulties. It was not until 1925 that a selective flotation method had been perfected, whereby the very fine-grained zinc-lead-copper sulphide ores could be separated. The following year further prospecting disclosed two additional ore bodies with an aggregate estimated at 6,600,000 tons containing gold, silver, copper, lead, zinc, iron and barium sulphate. Milling commenced in 1928 and a daily production averaging 1,200 tons has been maintained. The reserves of ore in the present deposits are limited and unless new deposits are found the life of the mine will be relatively short.

The mine is located five miles north of Red Indian Lake, roughly in the centre of the island, and is reached by a 37 mile private railway which branches from the Newfoundland Railway at Millertown Junction. A company township has been established with a population of 1,400 people, all at present directly dependant on the mine. Power for the industry is supplied by a transmission line from Deer Lake.

### Geological Summary.

The rocks of the Buchans area have been divided

into three groups. The oldest, termed the Buchans series, are volcanic lavas, breccias and tuffs and underlie most of the Red Indian Lake basin. A group of igneous rocks such as granite and quartz porphyry have been intruded into these volcanics, forming rugged country north and west of Buchans. Finally there are sills and dykes penetrating the lavas near the mines. The ore minerals were introduced after the intrusion of the igneous rocks and they occur chiefly in the tuffs. The ore zone is gently folded but no important fractures complicate the mining operations. An average of 450,000 tons is mined and milled yearly.

Production. (000's tons)

<u>Year</u>	<u>Zinc</u>	<u>Lead</u>	<u>Copper</u>	<u>Total</u>
1938	122	47	33	202
1939	106	41	50	197
1940	117	47	41	205
1941	117	47	26	190
1942	94	37	22	153
1943	109	46	22	177
1944	99	42	18	159
1945	94	40	18	152
1946	90	41	19	150
1947	70	34	16	120

Production figures 1938 - 1946 to nearest 1,000 tons from "Financial Post" Survey of Mines, 1948.

Other Minerals and Building Materials.

Fluorspar and limestone are chief amongst the other deposits that have been developed.

The fluorspar deposits are located near St. Lawrence at the southern end of the Burin Peninsula. Development was begun in 1932 and the product shipped to the smelting plant at Sydney, Nova Scotia. Production was stimulated during the war and rose from 8,000 tons in 1937 to 15,000 tons in 1940. In 1946 there was a further increase to 26,000 tons.



The main user is the steel industry and the production in Newfoundland is of significance to consumers in eastern North America who formerly imported fluorspar from Europe and South Africa. Production has increased since the war and the estimated figure for 1948 is 58,000 tons.

Limestone is quarried at Aguathana on the north side of St. George's Bay, and shipped to Sydney, Nova Scotia where it is used as a flux in the steel industry. Local uses for the stone are as ballast on the Newfoundland Railway, for building, and for agricultural lime. Estimated production figures for 1948 are 342,000 tons.

Brick Clay is found deposited along the coast and in the major river valleys. Principal workings are located round Trinity Bay.

Granite varying from coarse to fine grained, is of widespread occurrence. Labradorite is found on the north shore of Bay St. George but is not worked. The stone cleaves well and takes a good polish. Granodiorite suitable for building exists in the Bay of Exploits and Notre Dame Bay areas. Granite is quarried on the south coast at La Poile and Rose Blanche and has been used in the construction of light houses. Granite for use in railway construction has been quarried in Trinity Bay.

There are extensive deposits of gypsum in the Bay St. George district suitable for quarrying. The main use of gypsum is in the cement industry and as a basis for builders' plaster, but as yet the deposits have not been developed.

Marble occurs extensively along the west coast and in the White Bay region. White marble and blue-grey marble have been quarried at Canada Bay, but there has been no extensive development. There are also marble quarries in White Bay at Purbeck Cove and Sops Arm.

Sandstone is widespread but has only been

quarried in the St. John's region. A number of buildings in the city are built of this stone.

Slate in commercial quantities exists in two belts. In the east, it extends between Bonavista Bay and Placentia Bay, and is worked at Random Island, Trinity Bay, and at Paradise Sound, Placentia Bay. In the west the belt extends from Bonne Bay to Humber Arm. The only workings are at Humber Arm.



Fig.18.



## WATER-POWER.

An abundance of water-power is available in the island as demonstrated by Fig. 18. Most of the sites are located around the perimeter of the island at the plateau edge where falls and rapids have developed. Heavy rainfall throughout most of the year combined with high humidity and low evaporation produces a high rate of run-off, while the multitude of lakes provide natural reservoirs.

At present twelve sites have been developed with a total of 221,600 h.p. and nearly all these sites are capable of expansion. Twenty other sites which have been surveyed can produce an estimated total of 500,000 horse power. The largest are on the South Coast, at the head of Bay d'Espoir (250,000 h.p.) and Grey River (100,000 h.p.).

Half of the developed sites are within the Avalon Peninsula with a total of 11,100 h.p.

Two sites on the Exploits River at Grand Falls and Bishops Falls have been developed by the Anglo-Newfoundland Development Company to provide power for the wood-pulp industry. These sites have developed 34,500 h.p. The Bowater Mills at Corner Brook are provided with power from a plant situated at Deer Lake (156,000 h.p.).

## AGRICULTURE.

Agriculture has always played a minor role in the economy of the island. By tradition the outlook of the inhabitants has been away from the land towards the sea. The environment is particularly hostile to farming and further, the fishing season and the planting season conflict. The result is that farming has remained a subsidiary occupation to fishing and carried on for the most part by the families of fishermen and loggers.

Newfoundland lies relatively near the great food-producing areas of the North American continent whence cheap grain and meat could always be obtained in the past. So there has been no incentive to farm, and moreover, the home product would be much more costly than the imported owing to the expense of land-clearance, drainage and soil improvement.

### Physical Factors.

(a) Relief and terrain. The island is a rocky plateau lying mostly between 500 and 2,000 feet above sea-level and formed of ancient metamorphic rocks, resistant to weathering. Much of the surface is barren and rocky and there is little lowland where farming could develop.

(b) Soils. The land was stripped of its pre-glacial soils and the surface covered with infertile and sterile gravels and sands. The soils which have developed are podsolized, highly acid, leached of their mineral salts and full of boulders and stones. They need considerable amounts of phosphates and lime to render them fertile.

(c) Climate. Newfoundland lies close to the northward limit for agriculture. A July temperature of 57° is regarded as critical and it will be seen that this is the July average for most of the island (see fig. 5). It is interesting to note that the Lower Humber district and St. George's Bay district, where of recent years there has been a considerable development in farming, have a July average of 61°.



Rainfall is satisfactory, with 60 inches along the south coast, 36 inches in the south-west and 30 inches along the west coast. However, these areas show a summer maximum and rain falls on about half the days of the year. The growing season of 4 to 5½ months is short and the summers are too cool for grain production.

### Extent of Farming.

It has been estimated\* that only 157 square miles, less than ½% of the total land surface, are devoted to agriculture. (Compare with Prince Edward Island with 50% under farmland). The 1935 census lists some 4,226 persons as farmers and 39,539 persons as cultivating some land.

Since 1934, under the Commission of Government there has been considerable land improvement to encourage farming. Before the war projects were designed to settle persons on relief, and a number of agricultural settlements were created, but these met with only moderate success as the settlers had little farming background and the settlements were not always in areas of good soil. Since the war there has been more extensive soil survey and settlements have been established in areas of better soils. The settlers are veterans who express a desire to farm and they each have a small-holding of 10 acres. One of the largest of these projects is in the upper Humber district where there are estimated to be 20,000 acres of good agricultural land. Land clearance is progressing steadily and there are to date a total of 1535 acres of cleared land in these newly settled areas.

Principal areas of commercial farming are in the Avalon Peninsula and in the south-west, near the larger consuming centres. Lack of transport facilities necessarily limits economic farming, and this is one of the main reasons why farming was slower to develop

\* - "Empire Forests and the war."

Newfoundland Dept. of Natural Resources (c.1946).

on the west coast than in the Avalon Peninsula where both soils and climate are less suitable. Completion of the railway and the economic development of the Lower Humber district gave an impetus to farming in the west, and it is probable that the completion of the trans-insular road will bring about further development.

### Types of Farming.

Most of the farming is of the subsistence kind in small-holdings, and there are very few farms with over 50 acres. In some districts the only cultivation is in small gardens and is carried on as a part-time occupation. The vegetable garden is a characteristic feature of the small settlements where there is cultivable land. Suitable soils are often found on the raised terraces along the coast and on the gently shelving slopes at the head of the bays which indent the coast. Frequently, owing to lack of humus, soils have to be built up by additions of compost and fish.

### Farm Products.

A hay, dairy, root-crop economy is the general practice and hay and pasture constitute over half of Newfoundland's available acreage.

### Livestock.

Favourable moisture conditions during spring give permanent pasture a good start and excellent summer feed is produced, but frequently the pasture is over-grazed as the land is limited. Cost of production is high owing to the necessity of importing additional hay and grain feed. Dairying is the main pursuit on the Avalon Peninsula and on the west coast where there are nearby markets for milk products and transport is no problem. Both dairy cattle and sheep are grazed and in recent years there has been an increase in the number of sheep.

### Crops.

Truck farming for the supply of fresh vegetables



is carried on in the Avalon Peninsula and on the west coast. Vegetable crops have remained the basic production of the small farmer owing to small acreages and the necessity for quick cash returns. Potatoes are invariably the main crop. Lack of crop rotation and live-stock on the small farms is leading to a steady deterioration of the soils. There is little acreage under grain except oats which are cut unripe for winter feed.

Fruit-farming has commenced on the west coast and there are possibilities for its extension.



Plate 10. Torbay, Avalon Peninsula, showing settlement and farming. Note small size of fields, fenced gardens and stoney nature of soil.

## VII.

### EXTERNAL TRADE.

Newfoundland's foreign trade is limited by the paucity of the island's natural resources. The country is entirely dependent on the export of these resources to pay for the import of essential foodstuffs, consumer goods and equipment for the maintenance of its industries. The bulk of the people depend for their livelihood on the export of fish, forest and mineral products, and it has been estimated that nearly 50% of the people are dependent on the fishing industry alone. The island's economy is very vulnerable to the condition of world markets, and her foreign trade followed the general pattern in world trade for the period 1919-1939. The slump in 1921-1922 was followed by a rapid rise in values to 1929-1930, and the depression of 1930-1933 was followed by a gradual upward trend to the outbreak of war. With the abnormal conditions prevailing during the war, exports rose to \$49 million by 1945. Since then, they have further increased to a total of \$78 million in 1948.

During the period 1919-1939 fishing remained the major industry from the standpoint of employment, but in terms of export value it was surpassed between 1930 and 1940 by forest products and also by minerals in the period 1936-1940. Nearly one-half of the total export value was accounted for in the form of pulp and paper, the remaining half being equally divided between minerals and fish products. However, during and after the war years, rising prices again brought fish products into first place.

#### Exports.

##### 1. Fish and Fish Products.

Prior to 1939, two-thirds of the export value of these products was in dried, salt bulk, pickled and soft-cured codfish, and between 85% and 90% of cod exports consisted of dried cod. The remainder of the trade was in fresh cod, herring, and salmon, fresh and canned lobster, and whale and seal oils.



During the period 1921-1925 fish products represented about 60% of the total value of all exports, but by 1936-1940 they represented only about 20%. This was due to fall in the price of dried cod and also to increasing competition from Norway, Iceland and France. During the war these three countries were eliminated from the market, and rising prices increased the value of fish products. The traditional market for dried cod has always been the Mediterranean countries, and these together with Brazil absorbed 80% of the total export until the world depression and political events in Europe reduced these markets. However since 1938 new markets have been expanded in the British West Indies and the French Caribbean possessions. Since 1939, there has been a considerable increase in the export of frozen cod fillets to Canada, the United States and the United Kingdom. At present, exchange difficulties and the revival of British and Icelandic fishing are restricting exports to the United Kingdom.

## 2. Forest Products.

During the depression of the 1930's the newsprint industries in Newfoundland were maintained only in partial production, but by 1936-1940 newsprint held first place among exports, averaging about 48% of their total value, the peak point being reached during 1939-1940 with an export valued at \$17 million. During the war, exports declined sharply owing to the curtailment of imports into the United Kingdom and a shortage of labour in the forest industries. However since 1945, there has been a rapid expansion of the industry, and increased exports to new markets, in particular to the United States, have increased the relative importance of the industry which in 1947 accounted for nearly 40% of the total value of exports.

## 3. Minerals.

The export of iron ore and non-ferrous metals takes third place in terms of value and also of the number of persons dependent on it. The two main developments are the iron ore mines of Bell Island

and the zinc-lead-copper mines at Buchans. The Bell Island deposits which have been mined for fifty years, are of considerable extent. They are of good quality though high in phosphorus and silica content. Output is restricted only by demand. Prior to 1939, Germany was the main importer, with Canada taking second place. The United Kingdom and the United States took small shipments. Since 1939, exports to the United Kingdom have increased, reaching 750,000 tons in 1946.

Exports of iron ore followed the normal pattern of world trade between the two world wars and reached their lowest point in 1933 with a total of 194,000 tons. The highest was in 1938 with a total of 1,760,000 tons. The 1947 production was 1,280,000 tons of which 750,000 tons went to the United Kingdom and most of the remainder to Canada.

The Buchans deposits are of considerable economic importance, but surveys suggest that the reserves may be exhausted by 1956. Prior to the war, production averaged between 130,000 and 200,000 tons annually, the principal markets being Belgium, which absorbed two-thirds of the amount exported, followed by France, the United Kingdom, and the United States. The export value of the 1945 production was \$5,232,000, shipped mainly to the United Kingdom and the United States. Since 1945, exports of these minerals to France and Belgium have been increasing.

#### Imports.

Between the two wars, Newfoundland relied almost entirely on Canada, the United States and the United Kingdom as her sources of supply. Of the three, Canada was the greatest supplier and provided 37% of the 1938 imports, valued at \$17,900,000. The United States supplied 31% and the United Kingdom 24%. Thus, North America provided over two-thirds, due largely to proximity, lower transportation costs, and the adoption of North American tastes and standards. During the war years, imports from the United Kingdom were negligible and Canada's share increased considerably. By the end of the war Canada was supplying



almost two-thirds of Newfoundland's imports, the total of which amounted to \$65,800,000 in 1945. In 1948, imports totalled \$105,000,000, of which Canada supplied 52% and the United States 38%. The increase in value is due partly to an increase in prices and partly to an increase in volume. Imports consist mainly of essential foodstuffs, textiles and industrial equipment.

#### Direction of Export Trade

The general trend of Newfoundland's foreign trade has changed as her products have become more diversified, and as new processes have been adopted in the fishing industry. Today her main markets are the United States, the United Kingdom, and Canada. The United States and Canada buy nearly 50% of her exports.

SETTLEMENT.

The population of the island is small, totaling 316,000 (1945 census, preliminary figures), and is spread, for the most part, in small scattered communities round the coast-line, leaving the interior of the island almost uninhabited. More than 90% of the people live on or near the coast, and the only inland settlements are found along the railway in small towns where the mining and forest industries are centred. The unusual distribution of population is explained by two main factors. In the first place, the island was settled by fishermen and for four centuries fishing remained the island's only industry. Proximity to the fishing grounds was naturally of prime importance in the location of the settlers' homes. Secondly, the interior of the island has always repelled settlement owing to its rugged and barren nature, its lack of fertile soils, and its inaccessibility.

Fifty per cent of the people live in 1,200 settlements of less than 500 persons, and there are only 100 places with a population of more than 500. Many small fishing villages have less than 50 inhabitants and are nearly all characterized by their isolation. With the exception of the northern shores of the Avalon Peninsula, settlements are well-scattered and are located round the bays indenting the coastline, and on the islands fringing the shore.

The heaviest concentration is found on the Avalon Peninsula where 45% of the people live, and this includes the capital city with a population of 57,000. The population distribution map shows a remarkable concentration round the coast of Conception Bay, and along the east shore of Trinity Bay. The central area of the peninsula is uninhabited and the remainder of its coast-line is only thinly populated.

Along the east coast, settlement is grouped round Bonavista Bay and Notre Dame Bay, on the islands off the shore, in the multitude of bays, and on the small peninsulas which characterize this part of the island.





Plate 11. St. John's, looking east towards the narrow harbour entrance.



Plate 12. St. John's, showing the central section of the city with wharves and warehouses in foreground. Note parallel arrangement of streets in tiers above the water-front.

The northern peninsula is only sparsely settled, no doubt because the inhospitable shores of this northward extension of the island are ice-bound during the long winter, and the seas infested with ice in the summer months.

The south coast has a population of 42,000, spread thinly along the shore in small, scattered villages. Towards Burin Peninsula there is a greater concentration particularly round Fortune Bay and Placentia Bay. The coast is ice-free all the year, but it has not attracted settlement, no doubt owing to its rugged nature, the infertility of its soils and its lack of vegetation.

The west coast, with its fertile soils and better climate has a population total equal to that of the south coast. Here, historical rather than geographical factors account for the sparseness of settlement. Until 1904, fishing rights along the entire west coast granted under the Treaty of Utrecht in 1713 were still controlled by the French. Much of the settlement has taken place this century and is largely centred round St. George's Bay, the Bay of Islands, and Bonne Bay. Out of the 41,000 settlers, 15,000 live along Humber Arm, which leads into the Bay of Islands, mainly in the centres associated with the pulp and paper industry. Settlement has increased in recent years largely on account of the paper industry but also through the development of agriculture.

St. John's (56,709), capital of Newfoundland was founded towards the close of the 16th Century when the island was claimed for England by Sir Humphrey Gilbert. The main town is built on the steeply sloping west shore of the harbour, a deep-water, land-locked bay with a narrow entrance only 300 yards wide. The entrance cuts through a rocky coastal ridge between 600 and 700 feet high that shelters the harbour from easterly and southeasterly winds.

The water-front is lined with a series of wooden jetties backed by warehouses. This area of the port is used by sailing vessels and small fishing craft. The main docks for ocean-going ships are situated at the



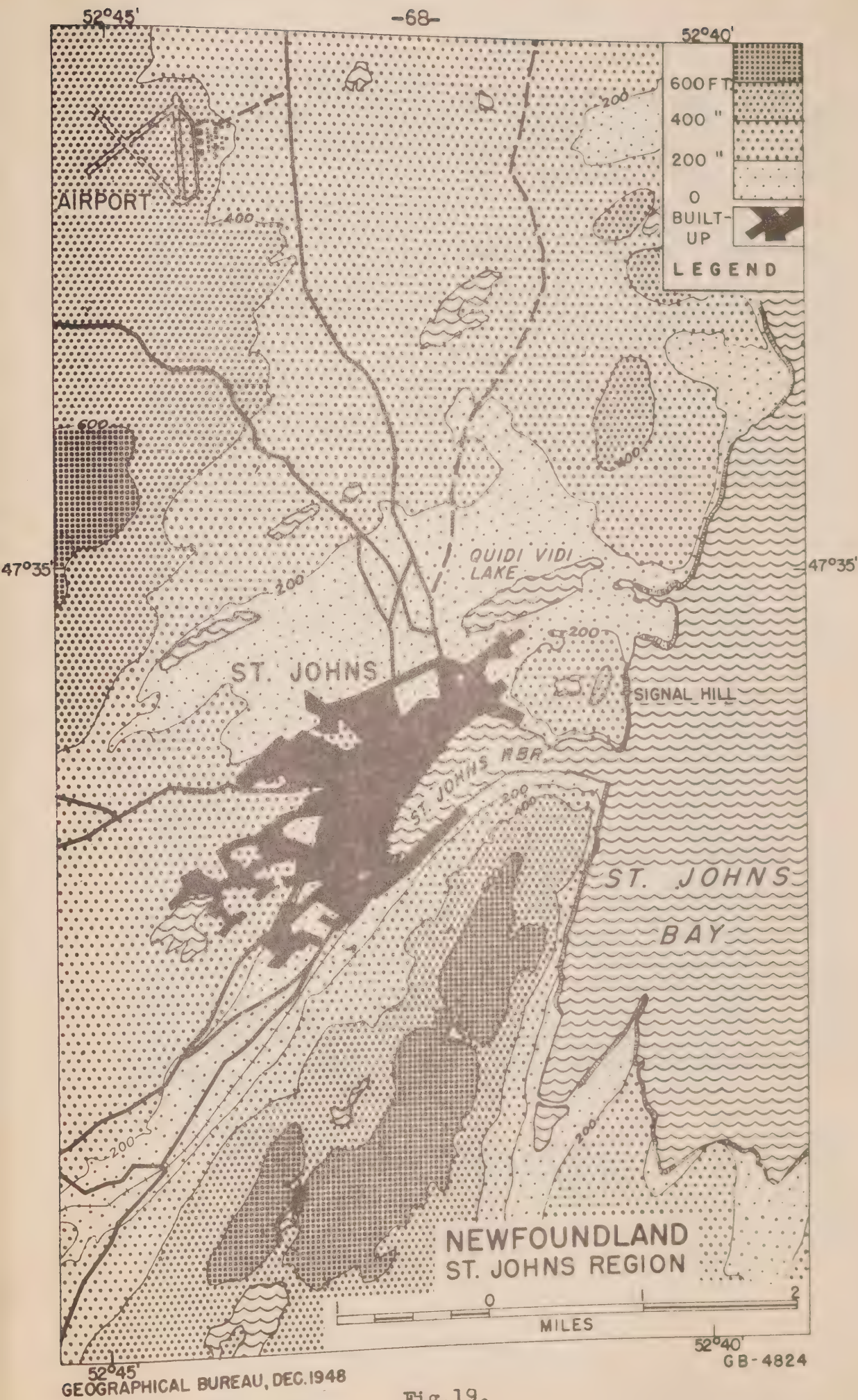


Fig.19.



northern and southern ends of the harbour. The drydocks and Naval Dockyard are at the southern end of the harbour where the terminus of the Newfoundland Railway is also located.

The principal streets run parallel to the water-front in tiers one above the other and are connected by short streets which climb steeply at right-angles to the water-front. The main shopping streets, Water Street and Duckworth Street are lined with brick-built offices and shops. The rest of the city consists of rows of congested wooden houses. Streets are laid out in an irregular pattern and tend to follow the contours. The arrangement of streets is quite different from the usual checker board plan common to most North American cities. There is no industrial area in the city and commercial life centres round the water-front, the dockyards and the railway.

St. John's is the site of the Newfoundland Government House, the residence of the Governor, and the principal Government offices.

Paved and gravel roads in a relatively close network radiate out from St. John's and connect the city with the main centres of population on the Avalon Peninsula and along the east coast.

Corner Brook together with Corner Brook West has a population of 8,635. It is a "company" town built in response to the pulp and paper industry created there in 1925. The town lies at the head of Humber Arm which leads to the Bay of Islands. It has modern port facilities but the harbour freezes over from mid-January to the end of April. The town is well-planned and modern and is backed by low, wooded hills. The suburb of West Corner Brook has some small wood industries and houses an industrial population.

Grand Falls (4,552), is the centre of the Anglo-Newfoundland Development Company's paper and pulp industry. The town was built by the company to accommodate its workers, and lies on rising ground to the north of the pulp mill. It is spaciouly planned, with a Civic Centre, hospital and recreation facilities.



The town is situated on the main line of the Newfoundland Railway and is the junction for the branch line leading to Botwood.

Botwood (2,744), at the head of the Bay of Exploits, serves as the summer shipping port of the paper mills at Grand Falls and the Buchans mines. Prior to the construction of Gander Airport and the transfer from sea-planes to land-planes it was a sea-plane base for transatlantic services.

Buchans (1,395), is situated 3 miles north of Red Indian Lake and is connected by branch line to Millertown Junction on the main Newfoundland Railway. The population is dependent entirely on the mining industry.



Plate 13. Deer Lake, looking east across the town and the power installations.

COMMUNICATIONS.

While the island remained a fishing colony and its inhabitants were dependant on this one industry and living in settlements along the coast, the sea provided a natural highway. But towards the close of the last century, Newfoundland was affected by developments on the mainland and turned towards the exploitation of its other resources which were to be found in the interior of the island.

The Railway.

In 1881 the construction of a trans-insular railway was commenced by a private company and completed by 1896. It was taken over by the government in 1923, through financial difficulties, and has since then been operated by a Board of Commissioners, together with the steamship routes which supplement the railway services.

The railway runs from St. John's across the Avalon Peninsula and swings in a wide semi-circle fringing the heads of the bays which cut into the east coast. It follows the 400-foot contour to Bishops Falls where it enters the Exploits valley and runs parallel to the river westwards to Badger. From this point the route commences to climb the Southern Long Range Mountains and crosses near the Topsails at a height of over 1,500 feet above sea-level. The route descends rapidly from the summit to Deer Lake and follows the Humber valley to Corner Brook. Beyond Corner Brook the railway runs southwest to Stephenville Crossing at the head of St. George's Bay and thence along the west coast and finally along the Codroy valley to the terminus in Port aux Basques.

The main line is 547 miles in length and is constructed of narrow gauge (3' 6") track, as compared with standard Canadian gauge of 4' 8½". Together with the branch lines still operating there are 704 miles of track in the island. During the summer months there is one train a day in each



direction, the Overland Express being scheduled to complete the run in  $22\frac{1}{2}$  hours.

Additions to rolling stock and equipment were made during World War II for defence purposes, and much work was done in reconstructing bridges and culverts, and in improving freight-handling facilities and cold storage capacity, particularly at St. John's.

### The Roads.

Roads have not been extensively developed anywhere on the island except in the Avalon Peninsula which has nearly one half of the total mileage. There are approximately 2,000 miles of motorable roads, and these are of gravel construction. There is only one section of paved highway, and this connects St. John's with outports along the west shore of Conception Bay.

Road construction has been a regional consideration and has been concerned mainly with connecting isolated districts with larger nearby settlements, or outports with settlements along the railway. The building of a trans-insular road has not until recently been regarded as an immediate objective.

Roads have been developed mainly in three separate areas and these are joined only by the railway. First, there is a well-developed network in the Avalon Peninsula with roads radiating out from St. John's to connect the city with outports in the peninsula and along the east coast northwards to Bonavista. Secondly, there is a gravel highway along the Exploits valley with branches leading to the Bay of Exploits and Halls Bay. Finally, there are the west coast roads in the Humber valley and round the shores of St. George's Bay. Projected roads will eventually join these three networks to provide a trans-insular highway.

Short sections of low category gravel highway have been constructed by the paper companies for the haulage of timber, as, for example, between the head of White Bay and Sandy Lake. No roads exist in the Northern Peninsula, along the south coast, or in the central area of the island.

### Sea Communications.

The Newfoundland Railway operates twenty vessels with gross tonnages ranging between 265 and 4,700 tons. Seven of the ships are used on coastal services and carry mail, freight, and passengers between points all round the coast. During the summer, these vessels call at most of the important settlements on the Newfoundland and Labrador Coasts, but the service is interrupted in winter by ice, and many of the outports are completely isolated. A service is also maintained between Port aux Basques and Sydney, Nova Scotia, in conjunction with the overland route from St. John's.

### Air Communications.

Newfoundland occupies a position of considerable importance in air communications between the cities of western Europe and the densely settled areas of the North American littoral. The island is the closest point to Europe and it lies on the great circle route between these populated areas. When transatlantic air services were still in an experimental stage, work was inaugurated by the United Kingdom government to construct an airport at Gander and a seaplane base at Botwood. When war broke out, the air facilities were extended at Gander and in 1941 the station was taken over by Canada and further improved. The present day airport is one of the finest in the world and is used by many transatlantic air services. An additional airport was constructed during the war at Goose Bay, Labrador, as an alternative base, and in 1941 Canada was also granted the right to construct a base at Torbay. Extensive air bases were also speedily constructed for defence purposes by the United States at Argentia and Stephenville. Gander, Goose Bay and Torbay are now civilian airports and are used to provide communication between Newfoundland, Canada and the United States, in addition to the transatlantic services.

For air distances, see Strategic Location Map, Fig. 1, page 1.



LABRADOR.

Labrador, a northeastern spur of the North American continent, stretches from the Strait of Belle Isle, latitude  $51^{\circ} 20'$  N. to Cape Chidley, latitude  $60^{\circ} 20'$  N., a distance of 600 miles. The country has an area of 110,000 square miles, nearly three times the size of Newfoundland. On the west and south it is separated from the Province of Quebec by a boundary which, still unsurveyed, is only roughly delimited. In the south the boundary is defined by the  $52^{\circ}$  parallel, and in the west it follows "the crest of the watershed of the rivers flowing into the Atlantic ocean until it reaches Cape Chidley". The boundary was established in 1927 by a decision of the Judicial Committee of the Privy Council, when Newfoundland's sovereignty over Labrador was finally confirmed.

The whole region forms part of the Canadian Shield. It is built of ancient crystalline schists and igneous rocks which in the course of long ages have been compressed and greatly deformed. There is no evidence of unaltered sedimentary rocks within the area. Surface materials are for the most part of glacial origin and consist of morainic debris, and deposits of sands and gravels.

The surface is elevated to heights averaging between 500 and 3,000 feet above sea-level. Tanner describes the southeast as an undulating rocky plateau which broadens in the central part of the peninsula into a great plain with gently rolling topography broken by ranges of hills and isolated heights rising between 250 and 500 feet above the general level. The surface is covered with a mosaic of lakes, ponds and swamps and dissected by a complex pattern of river valleys cut deep into the surface. Valley sides are steep and rocky with sharp and abrupt edges leading to the upper surface of the plateau. In the more elevated parts of the peninsula the valleys are as much as 3,000 feet deep. Often, only small facets of the surface are left as inter-stream areas. In the north, the plateau is dominated by mountain ranges with summits rising to over 5,000 feet. The Torngat Mountains with their alpine forms and saw-toothed outline give rise to a spectacular landscape. The coastline here



Fig. 20.



is both bold and rugged, with promontories rising to 3,000 feet directly from the sea. Throughout its length the coast is indented with bays and fjords which penetrate deep inland, and is fringed with a multitude of small rocky islands. Hamilton Inlet, the largest bay, leads to Lake Melville at the head of which Goose Bay Airport is located. This waterway can be used by vessels up to 21 feet draught during the ice-free summer months. This was an important factor in the construction of the airport.

The country lies in the same latitude as the United Kingdom, but owing to its position on the eastern side of the continental land-mass, and the chilling effects of the cold Labrador Current, the climate is extremely rigorous. In the interior there is essentially a continental regime with very cold winters, relatively warm, though short, summers, and summer rainfall. Along the coast, the marine influence dominates, and winters are milder and precipitation is at a maximum in autumn and winter. The Atlantic coast and the immediate hinterland has variable weather, rain and sunshine alternating. In January, south Labrador has similar temperatures to southwest Greenland and northern Newfoundland. January mean sea-level temperatures decrease from 10°F. in the south to -10°F. in the extreme north of the peninsula. In July the south coast has a 53°F. mean and this decreases northwards, to 42°F. at Cape Chidley. In the interior in winter, temperatures, it is reported, may drop as low as -60°F. After snow-melt they rise rapidly. The heaviest precipitation is experienced along the southeast coast with 39 inches in the vicinity of Battle Harbour. Precipitation decreases northwards to 29 inches along the Lower Hamilton River, and 20 inches at Cape Chidley. In winter, winds from the west and northwest are cold and dry, while winds from the southwest are warmer and bring rain. Meteorological data for the country is very scarce, and there are no records for the duration of snow cover.

South of 55° latitude, Labrador lies within the Boreal Conifer Forest Region, and has a forest cover similar to that of Newfoundland. To the north, the vegetation is of the tundra type. The tundra stretches south as a narrow belt along the entire length of the coast, and presents a bleak and barren picture from

the sea. The main factor in the barrenness of the coastal belt is the cold Labrador current, and the ice-belt which closes the coast for eight months in the year. Remunerative forest is found inland in sheltered valleys on well-drained slopes. It has been observed that the quality of the trees improve inland where black spruce and balsam fir may average 50 feet in height. Tanner, who led expeditions to the country in 1937 and 1939, estimates that 15,000 square miles of exploitable timber exists, but reports that vast tracts are either burnt or covered with a dense growth of low quality trees and scrub.

The chief resources are mineral ores, the forests, fish and furs. At present fur-trapping and fishing are the only regular sources of income. Leases have already been granted for the exploitation of the forests but, as yet, little work has been done. A further source of potential wealth lies in the water-power resources which remain unharnessed. The principal falls are on the Hamilton River at Grand Falls, where it has been provisionally estimated that 1,200,000 horse power can be developed.

Labrador's mineral resources are, as yet, undeveloped. Enormous reserves of high-grade iron ore are known to exist along the Labrador-Quebec boundary, and these have been surveyed by the Labrador Mining and Exploration Company, a subsidiary of the Hollinger mining interests. Geological survey was commenced in 1938 over an area of 20,000 square miles and deposits of iron ore were discovered on both sides of the boundary. For the preliminary mining operations equipment was flown in as no ground communications exist. In order to develop the area it is proposed to build a road and a railway from the north shore of the St. Lawrence. The project will require a very high capital expenditure but the prospects are considerable.

Labrador, with a present population of 5,525 is virtually uninhabited. These figures include Indians and Eskimos. The latter, along with the few white settlers, live along the coast in small fishing villages. Port Hope Simpson (352) and Hamilton (229) are amongst the largest settlements.



## APPENDIX A.

### PLACE NAMES OF NEWFOUNDLAND.<sup>x</sup>

The place names of Newfoundland are delightful in their variety, quaintness and historical associations. They have an imaginative quality and often an intrinsic beauty in their sound. "One of the great attractions of Newfoundland's names is the way in which they reflect the human history of the island. They recall in clear definition the varied origins of the men who discovered, exploited, colonized, fought for, and traded with Newfoundland through the four hundred and fifty years that have passed since its discovery by John Cabot". Consider for example: English Harbour, French Bay, Portugal Cove, Jersey Harbour, Canada Bay.

The hardships encountered in the settlement of the island are reflected in: Famish Cove, Empty Basket, Bleak Island, and Breakheart Point, but at the same time there is often an element of perverse humour. "An amusing contradiction in meaning has arisen from an habitual mispronunciation in the case of Bay Despair. Originally this was Baie d'Espoir or Bay of Hope! On second thought, perhaps the modern title came from "hope too long deferred".

However, there are names reflecting happiness and content: Happy Adventure, Safe Harbour, Heart's Desire, Sweet Bay, Little Paradise, to quote a few.

Other names derive from occupations and local characteristics: Millner's Arm, Fox Trap, Emily Storehouse Cove, Wesleyville. Local fauna are represented in Little Cat Arm, Silver Fox Island, Newfoundland Dog Pond, White Bear Bay, Whale's Gulch.

"The Newfoundland coast is studded thickly with islands and as these often seem to be set down in pairs

x - From an article by Dr. H.L. Keenleyside: "Place names of Newfoundland" published in the Canadian Geographical Journal, December, 1944.

it is not unusual to find them given related names: Fair and False, Lord and Lady, Bread and Cheese." There is also an attractive inversion of double names such as: Harbour Grace, Bay Bulls, Bay Roberts, "and even Harbour My God."

There are also to be found intentionally amusing names: Noggin Cove, Nick's Nose Cove, Blow-me-down, Ha Ha Bay, Nancy Oh Nancy Bark; repellent names: Pinchgut Point, Maggoty Cove, Crooked Feeder River; unusual names: Offer Gooseberry Island, St. Jones Within, St. Jones Without, Great Rattling Brook, Juniper Stump, Horse Chops.

These colourful old names lend much charm to the island and Newfoundland has been happily successful in avoiding the confusion of borrowing names common in other countries.



## APPENDIX B.

### MAPS AND SURVEY.

#### Topographic Survey.

Surveys are being carried out for the purpose of preparing topographic maps covering the island at a scale of one inch and two inches to the mile. Most of the work to date has been carried out in the Avalon Peninsula and in the Humber District. The work is controlled by ground points established by geodetic survey and detail supplied by aerial photographs.

At present five sheets have been published covering the Avalon Peninsula and three sheets are in course of preparation.

Two sheets have been published in the Humber District and three more sheets are being prepared. A further sheet covering Grand Falls is also in work, at one inch to the mile and two sheets to the north at a scale of two inches to the mile.

#### Geodetic Survey.

Preliminary work to form a basic triangulation system was commenced in 1935 by the Surveys Division of the Department of Natural Resources in co-operation with the Geodetic Service of Canada. The basic triangulation consists of a chain of first order triangles extending along the western side of the Island from Port Aux Basques to Belle Isle and will form a section of the triangulation system surrounding the Gulf of St. Lawrence.

#### Maps.

The whole island is covered by a sheet at the scale of ten miles to the inch, published by the Crown Lands and Surveys Branch of the Department of Natural

Resources, Newfoundland, in 1941. It shows communications, settlement, hydrography and spot heights, but is uncountoured. The island is also covered by five sheets of the National Topographic Series at a scale of eight miles to one inch, published by the Department of Mines and Resources, Canada, and revised up to 1944-1947.

### Charts.

The island is covered by charts at varying scales published by the United States Hydrographic Office, British Admiralty and Canadian Hydrographic Survey.

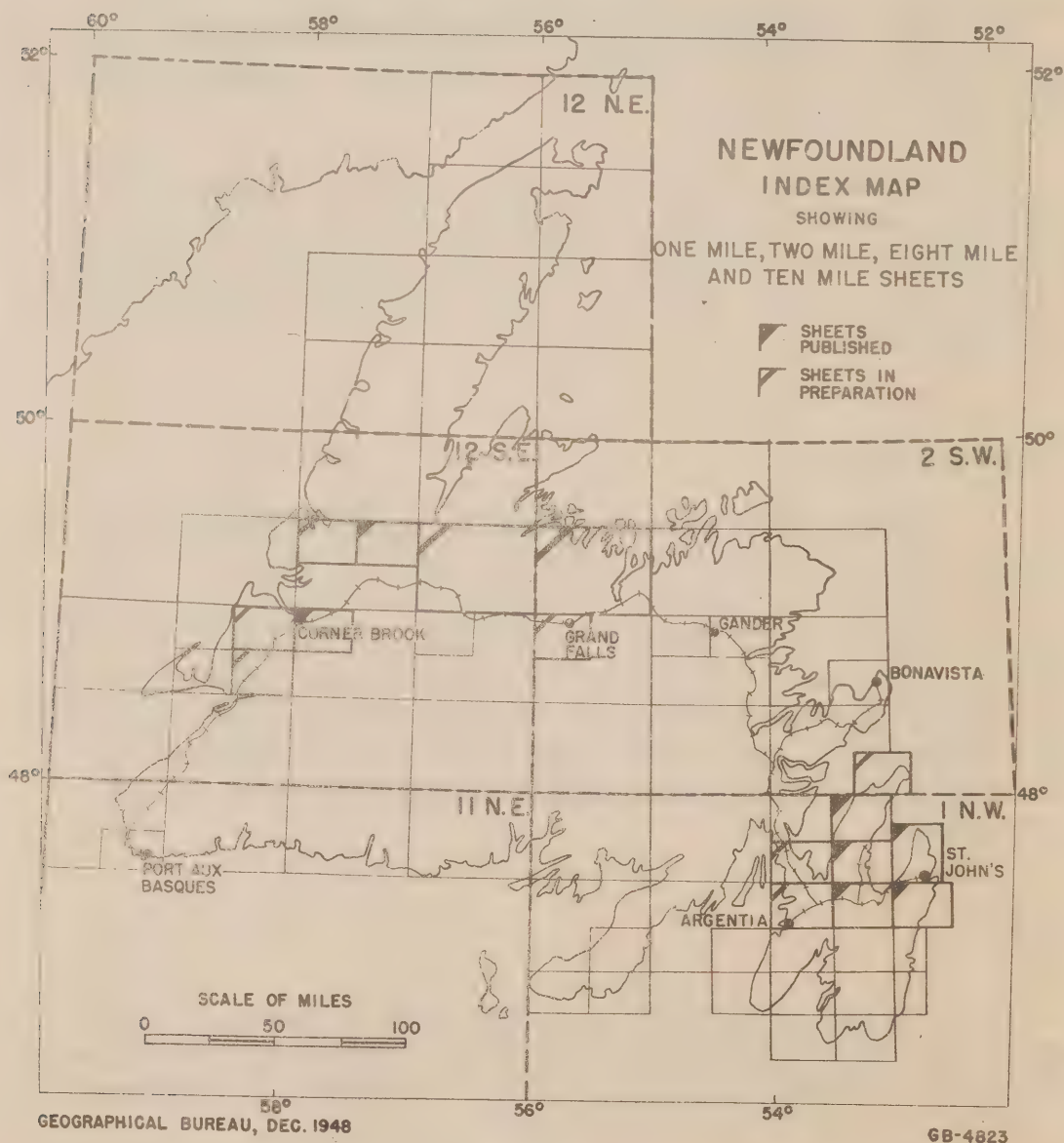


Fig. 21.



APPENDIX C.

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# NEWFOUNDLAND DISTRIBUTION OF POPULATION 1945

LEGEND  
ONE DOT = 100 PERSONS

- 500 - 1,000
- 1,000 - 1,500
- 1,500 - 3,000
- 3,000 - 9,000

56,000

